

PUBLIC WORKS

Feb.
1954

CITY, COUNTY AND STATE

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Kenneth K. King is Public Works Director of Phoenix, Arizona, in charge of all utilities, including streets, water and sewers. See page 28.

PAYLOADER Gets 3-Way



OWNER

OK.

"I couldn't get along without my Hough 'PAYLOADER'. It does a rugged job and is easy to handle when the going is rough", says Joseph J. Girardi, President of New Rochelle Construction Co.

SUPERINTENDENT

OK.

"I have no trouble staying on the job schedule with the Hough 'PAYLOADER'. There is not another machine on the market that can do the job it does", says Mr. Girardi's Superintendent.

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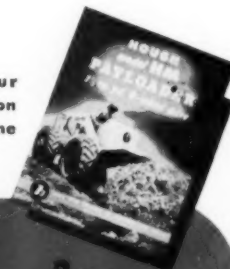
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"A Hough 'PAYLOADER' is a fine machine. It is easy to operate, with good visibility", says the operator of this 4-wheel drive Model HR "PAYLOADER".



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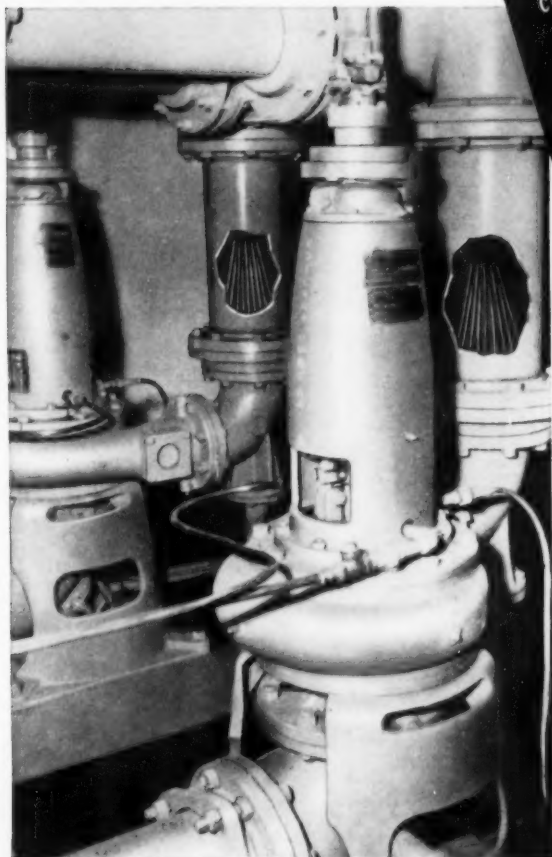
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Flush-Kleens can't clog because rags never reach the impeller. Specially designed strainers in the discharge line retain all coarse matter. Sewage flows over the strainer and through one of the pumps to the wet well. When the pumps operate alternately they pump only strained sewage. No rags or coarse material ever pass through the pump casing. Each strainer is automatically flushed clean during its pumping cycle.

One of 11 Flush-Kleen Lift Stations installed in the City of Portland, Oregon. The discharge line has been cut away to show the strainer. These stations were designed by Stevens and Koon for the Engineers Portland Sewerage Project.

Scru-Peller Pumps are designed specifically for pumping primary sludge, are positive in operation and truly clog-proof.

Continuous multiple shearing action is provided by stellited cutting edges of the screw and eight stellited cutting bars positioned in the screw and pump housings.

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Three of the 27 Scru-Peller Pumps installed at the Hyperion Sewage Treatment Plant, Los Angeles, California. Board of Public Works and Metcalf & Eddy, Engineers.

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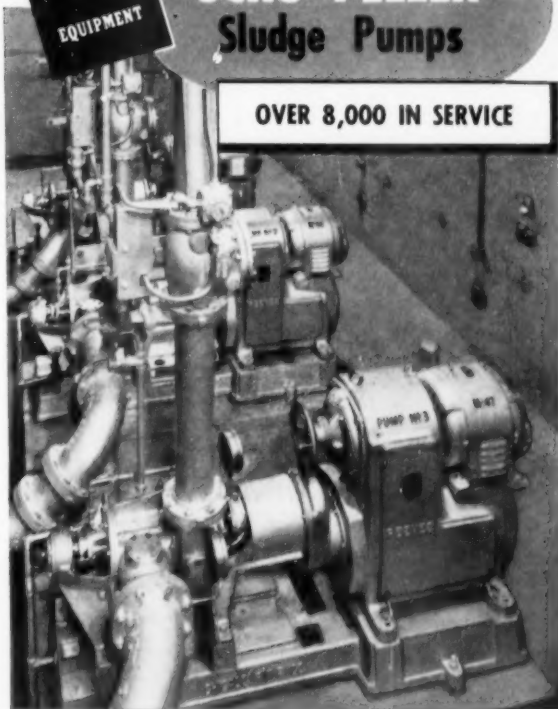
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The D8, with No. 8A Bulldozer, shown above, is widening and straightening a mile-long stretch of road where logging trucks and sharp curves had caused a traffic hazard. This big yellow tractor does most of the heavy pioneering and rough grading, as well as clearing a lot of snow in winter. In addition the district uses a Caterpillar No. 12 Motor Grader and an HT4 Shovel.

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THERE'S NO SAFE SUBSTITUTE . . . Clay Pipe Sewerage MUST Keep Pace With Every Growing City!

Public officials in the Greater Minneapolis area know how important safe sanitation is to fast-growing new residential areas. This one project alone—the Ardmore addition to the city's southwest borders—calls for 7,892 feet of Clay Pipe. Another \$4,000,000 project in the suburb of Richfield will require an estimated 100 miles of Clay Pipe. The Richfield project will be handled by the G. M. Orr Co., consulting engineers, under the supervision of Robert Huston, design engineer.



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ENGINEERS are assured their professional reputations will be enhanced by years of trouble-free service, because Clay Pipe can't be corroded by acid waste or sewer gases.

CONTRACTORS know they can count on Clay Pipe for fast, easy installation and ready availability.

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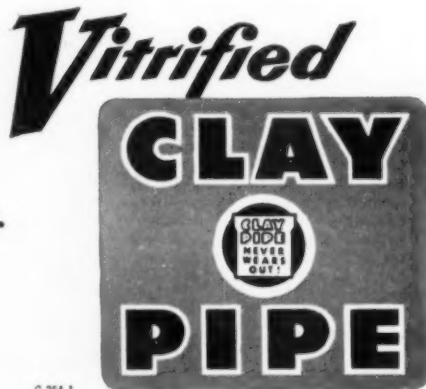
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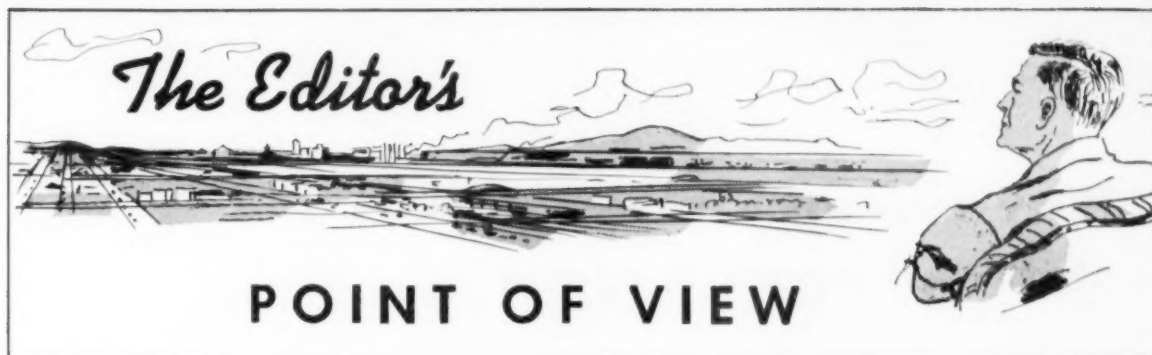
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The Specialty Board: A First Big Step for All Engineers

WHEN the Joint Committee for the Advancement of Sanitary Engineering worked out the initial procedures for a program of certification for sanitary engineers, a big step forward was taken. Since then, the Board of Direction of ASCE has approved the recommendations of the Joint Committee so that a Specialty Board will soon be formed and the program of certification started. Though this first step will include only sanitary engineers, there are signs that the idea will be expanded and will be applied to many other types of engineering skills, proper recognition of which has been long and sadly lacking.

There is still further promise in the evident determination of the Joint Committee to provide a leadership which has been lacking in the engineering field, perhaps especially in sanitary engineering where so much of the work is of a staff nature and has to be done in cooperation with other professional skills. Finally, we think that the highest type of congratulations are due to the American Society of Civil Engineers for its courage and foresight in this forward looking program to provide service for engineers in a new and untested field.

Slow Down, Brother—Or Else! And Let's Build Adequate Roads, Too

FINALLY aroused by the summer bulge of traffic accidents in recent years, eleven northeastern states have united in a summer speed control program by which, it is hoped, the indicated traffic toll of some 2,000 dead and 125,000 injured will be reduced. The program will include intensification of police effort, enforcement by the courts and a broad educational program directed toward the individual motorists. It will be the first regional effort of the kind ever undertaken in this country.

There is no question that speeding has been a big factor in our tremendous accident toll and that it should be curbed; but it is not the only factor. We need better policing of our highways to curb the careless driver; but we also need more roads, and lots of them. We have permitted di-

version of road moneys on a shameful scale; and we have failed to keep up with the needs resulting from more cars and increased highway usage. The slow-down campaign is fine—but right now is also the time to start an adequate highway construction program.

The Public Be—Told

PROBABLY he never said it, but one of the early railway tycoons is credited with the comment, "The Public be Damned", when questioned concerning public reaction to some move by his railroad.

All public officials realize that such an attitude is not possible in their work, but what steps are they taking to inform the citizens of the facts concerning their municipality, county or state? The written word through newspapers and magazines is good but it should be supplemented by other media. We recently published an article telling how motion pictures could be used to promote a special project. We also had a description of the successful public conferences held in Phoenix, Arizona. We have described a municipal broadcasting program in Brookfield, Illinois, in a recent issue.

Perhaps you have done something, outside the regular routine, to tell your citizens about a special project, or perhaps just the regular operations covered by your job. If so we would be glad to know about it so that the information can be passed along to help some other community.

Providing Refuse Disposal Facilities for the "Rurban" Dweller

WHETHER you call them "rurban" dwellers or "urral" folks, the people who live in urban-type sections beyond the reach of such city services as refuse collection, need and should have such special services. Health is one factor; good municipal housekeeping is another. In any case, we think counties or townships should plan to provide these facilities. A recent survey by this magazine shows that quite a number of counties have already established sanitary landfills; in a few cases, this has been done by townships. Anyway, it is a job that should be done, and the sanitary landfill seems specially suited to the problem.

Why research never says: "let well enough alone"

Anyone might fairly assume that cast iron pipe which has served, and is still serving, over 50 American cities for more than a century, is as efficient and economical as pressure pipe can possibly be. Our member Companies have not been content to rest on that assumption.

By continuous research and development, they have attained, in *modernized* cast iron pipe, greater toughness, strength and uniformity to a point resulting in still greater efficiency and economy.

Modernized cast iron pipe is centrifugally-cast. Where needed and specified, it is lined with cement mortar centrifugally applied, resulting in a tuberculation-proof pipe with sustained carrying capacity and, therefore, reduced friction loss and pumping costs.

If you want the most efficient and economical pipe ever made for water distribution, your new mains will be laid with *modernized* cast iron pipe with either mechanical or bell-and-spigot joints. Cast Iron Pipe Research Association, Thos. F. Wolfe, Managing Director, 122 So. Michigan Ave., Chicago 3.



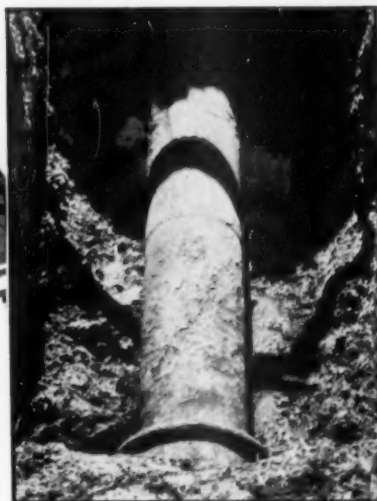
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The Q-Check stencilled on pipe is the Registered Service Mark of the Cast Iron Pipe Research Association.

Modernized **cast iron**



This cast iron water main, uncovered for inspection, is in good condition after 100 years of service in Alexandria, Va.—one of more than 50 cities with century-old water or gas mains in service.



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BUCKLIN POINT SEWAGE TREATMENT PLANT

EAST PROVIDENCE, R. I.

Blackstone Valley Sewer District

METCALF & EDDY
ENGINEERS

BOSTON, MASS.



① View of Bucklin Point Sewage Treatment Plant showing preliminary settling tanks Nos. 1 and 2 in left foreground; sludge pumping station and dewatering and service building to left center; screen and grit building at right, in front of digestion tanks and digestion control building.

Perhaps the outstanding pollution abatement battle in New England is being waged by Rhode Island's Blackstone Valley Sewer District Commission. At Bucklin Point has been built the first stage of a fully integrated sewage interception and primary treatment system which ultimately will be capable of handling a total sewage flow (including industrial wastes) of 47 MGD.

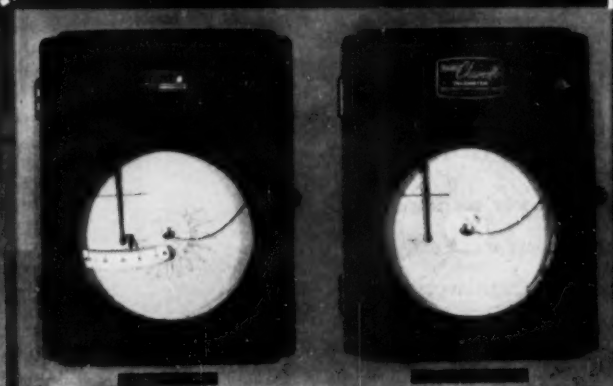
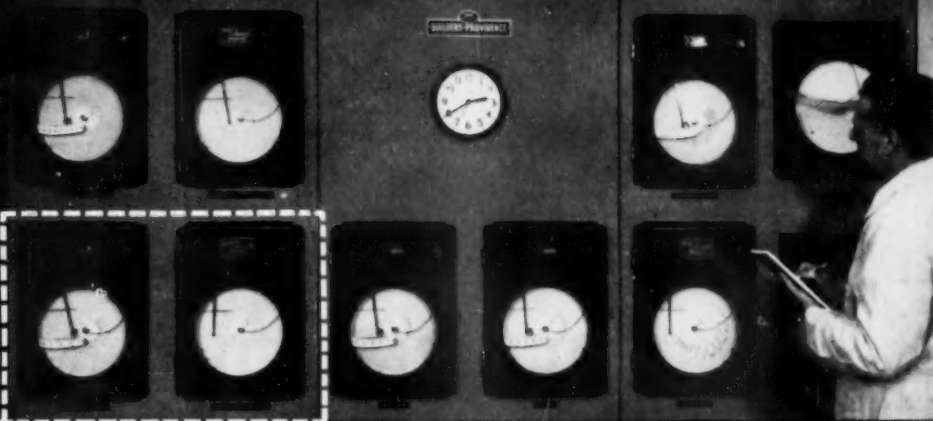
The Bucklin Point Plant was designed by Metcalf and Eddy and built by F. H. McGraw & Co. of Hartford, Conn. under the immediate direction of the Blackstone Valley Sewer District Commission headed by W. J. Halloran. Metcalf & Eddy also served as consultants during the construction program. To obtain a detailed description of Builders Metering and Chlorinating Equipment furnished for the Bucklin Point Plant, write Builders-Providence, Inc. (Division of B-I-F Industries, Inc.), Providence, Rhode Island.



② Chronoflo Indicator in Chlorine Control Building shows summated total of sewage flow through two Parshall flumes, enabling operator to set proper chlorine dosage.

BUILDERS -

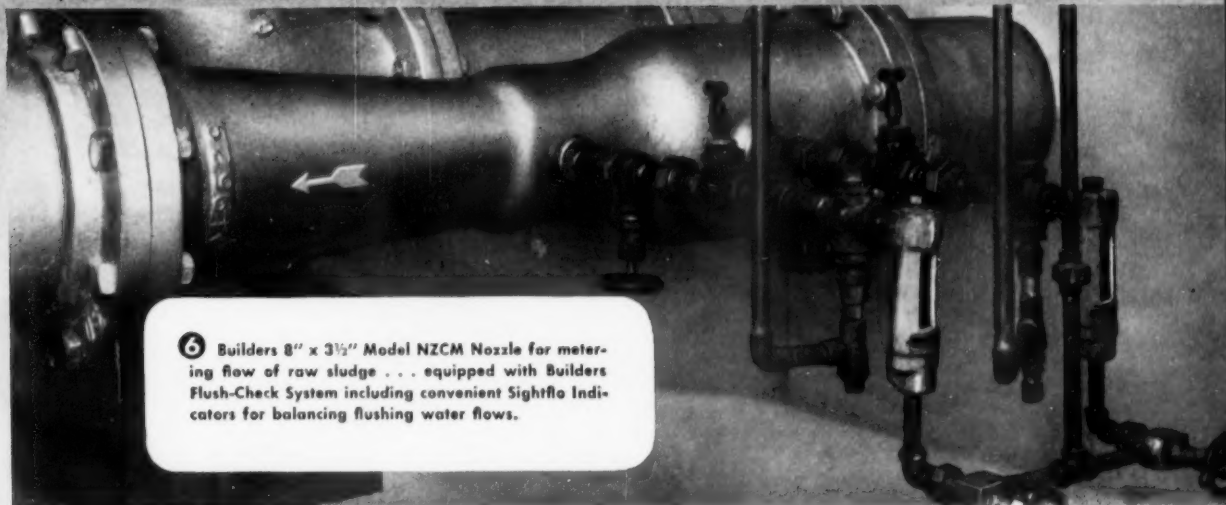
③ Main Panel in Administration Building. Reading from left to right, meters include: two raw sewage influent meters and two instruments for recording submergence of raw sewage Parshall flumes; total sewage meter; total air meter; air-sewage ratio meter; Omega Pumping Station flow meter; and meters for recording chlorine rate and outside air temperature.



④ Close-up of East Providence interceptor flume meter (Chronoflo Totalizer-Recorder with pen arm indicator) at left and submergence meter (Chronoflo Recorder) at right. Submergence instrument permits correction of influent meter according to degree of submergence of Parshall flume. All major instruments in the Plant are Builders Chronoflo, utilizing simple, two-wire electrical transmission.



⑤ Builders Visible Flow Chlorinizers at Bucklin Point — Model HCVS, capacity 100 to 6,000 lbs. per 24 hr. each. These Chlorinizers, originally installed for interim disinfection of raw sewage before discharge into the Seekonk River, were earning money for the Blackstone Valley Sewer District Commission even before the plant was in complete operation.



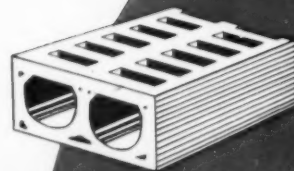
⑥ Builders 8" x 3 1/2" Model NZCM Nozzle for metering flow of raw sludge . . . equipped with Builders Flush-Check System including convenient Sightflo Indicators for balancing flushing water flows.

— PROVIDENCE
PIONEERS IN METERS AND CONTROLS

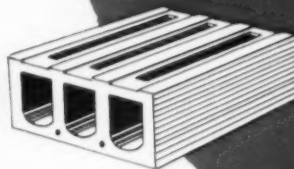


6 reasons why TRICKLING FILTERS are best for sewage and industrial waste treatment

They are low in cost. Overall costs are generally lower with trickling filters. First costs are reasonable. And operating costs will really save your community money. In most small plants, one man working 40 to 44 hours a week, can do the work. You don't need 'round the clock operation. You may wish to have a helper, but usually you don't need one. You can save more on operation than in any other way. And you can get good results year after year. Also trickling filters are: easy to operate; have long life; produce top-notch effluent; are flexible, overload is no problem; and they are reliable and easy to expand.



BOSCO

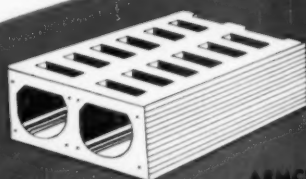


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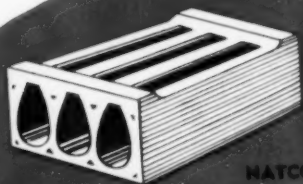
This new Biofiltration plant at Bethlehem, Pa., is a fine example of modern sewage treatment. It was designed by Morris Knowles, Inc. of Pittsburgh and Thompson Constr. Corp. of Albany, N.Y. was the contractor. For this job the engineers chose Dorr Biofiltration equipment, famous for its good engineering and dependability. The plant serves 100,000 persons, average design capacity is 12.5 mgd.



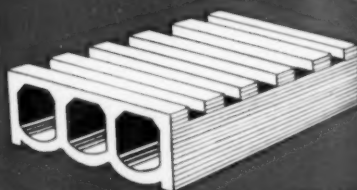
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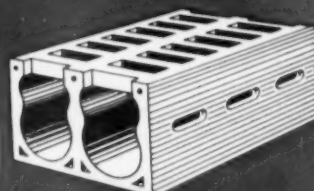


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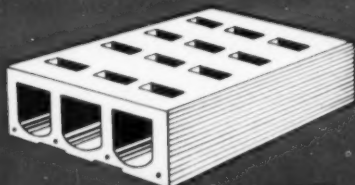


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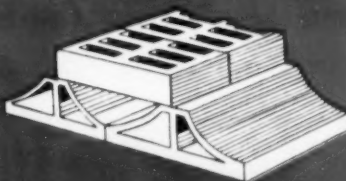
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NEW construction techniques have made constantly increasing demands for the right kind of machinery. Today, communities need modern equipment in order to plan and complete projects efficiently and economically.

In an effort to cooperate fully and to meet these demands, Allis-Chalmers offers completely new designs like the HD-15... a machine that takes advantage of even the most recent developments in tractor application.

The design of the HD-15 also makes full use of new metals, new oils and greases, and the latest manufacturing processes. Existing models were not allowed to restrict Allis-Chalmers engineers... so they worked right from the ground up, matching part to part, assembly to assembly, and the entire tractor to its Allied equipment. As a result, the HD-15 offers new standards in ease of operation and service, as well as long-life performance. With outstanding balance characteristics, it handles both mounted and drawn equipment well, provides maximum flexibility for a wide variety of jobs.

We invite you to talk with your nearby Allis-Chalmers dealer to compare values... see for yourself how the HD-15 can be a big factor in helping you to plan effectively and work economically.

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TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

HD-15

109 drawbar hp.

27,850 lb.

Six speeds forward to 5.8 mph.

Three reverse speeds to 4.5 mph.

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Constant progress in earth-moving methods has been matched by such design advances as this HD-15 and

its engine-mounted dozer . . . which were engineered and tested as a unit, right from the start.

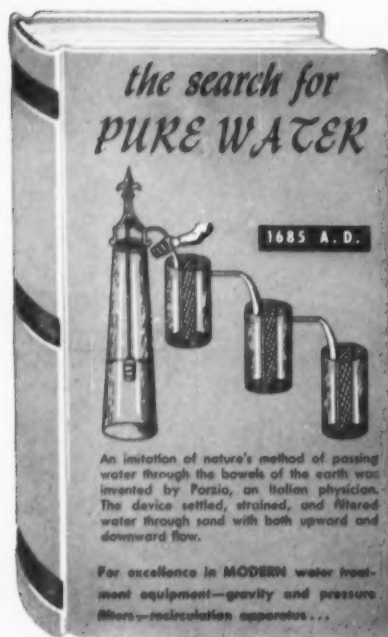


This HD-15 Tractor Shovel is a tool which introduced a new era of tractor usefulness. It moves from job to job easily and does traditional jobs in a better, faster way.



The improvements and refinements of really modern design take on new significance as budget planning gets more important. Extra yardage handled . . . or lubrication time saved means working more efficiently, at lower cost.

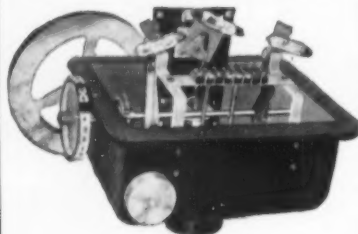
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DARBY, PENNA.

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People, Ideas and Events

BY "DOC" SYMONS



H.T.M.A. — And as I write this column, it is almost the end of 1953. Although you won't read this until Feb. 1st, it seems like a good time to imitate Janus and look backward and forward at the same time.

★ ★ ★

Looking back to the Miami Convention of the Federation, I remember that "Gus" Herzik, Chief Engineer of the Texas Bd. of Health had the audience in an almost continuous chuckle when he appeared on the Industrial Waste Forum.

Gus began his talk with the statement that Texas was admitted to the Union on Sept. 21, 1836, and that on Sept. 22, 1836, was told the first of 42,705 jokes about Texas. Then he proceeded to tell the 42,706th.

★ ★ ★

Also at the Federation Miami meeting, I was fortunate in being invited to two delightful cocktail parties. The first was the annual party in honor of the Board of Directors and their wives, given by Mr. and Mrs. Harry E. Schlenz of the Pacific Flush Tank Co.—Unfortunately, Mrs. Schlenz (Norma to her host of friends) was unable to attend, but she promises to be on hand in Cincinnati in '54.

★ ★ ★

Another party at Miami was at the home of Ralph B. Carter, Pres. of R. B. Carter Co., Hackensack, N. J. "Nick", as Mr. Carter is known, lives in a beautiful setting with the waters of Biscayne lapping at the sands of his front yard. As we watched the sun set across the Bay and behind the mainland, we listened to a Calypso band, enjoyed the hors d'oeuvres washed down with Heineken beer or what you wished, swapped stories and danced a bit.

★ ★ ★

It was at Nick Carter's party where the irrepressible Lou (Trans-lite Pipe) Frazza and his wife (who is a doll) faked me out completely

with some strange four-toed animal tracks in the wet sand of the beach. Lou Fontanelli, FSIWA Prexy was there to watch the fun—I tracking the prints while Lou was making more behind my back.

★ ★ ★

Luminous Quote — I read this in the "Chicago Tribune": "The big question isn't whether or not you fail, but rather how you exhibit your failure."

★ ★ ★

Many of you may remember Joe E. Rehler, who was superintendent of water and sewage at Olean, N. Y., before World War II, and who was active in the NYSIWA until he entered the Navy.

Joe (and Marian) was last seen with 2½ stripes at the Federation meeting in Washington in 1950. Three years later he was wearing four stripes as a Captain in the C.E.C., USN, and is in charge of the Public Works Dept. of Fleet Activities and the Officer in Charge of Navy Construction in Japan. As such, Joe heads a \$14,000,000 yearly business—Just shows what water and sewage men can do.

★ ★ ★

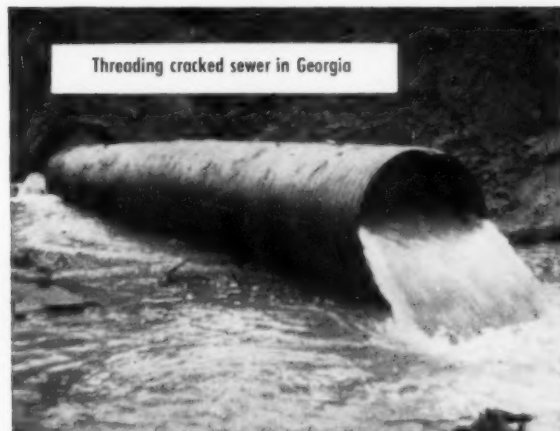
Swedefinition — A BORE is a person who wants to talk about himself when you want to talk about yourself.

★ ★ ★

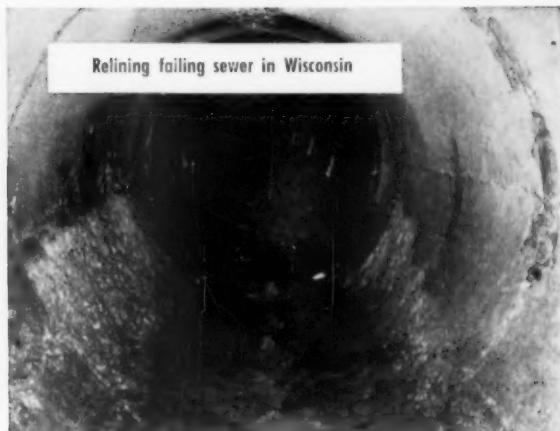
A Christmas greeting from John Stewart, Manager of the WSWMA tells me that the episode of the menus at the NEWWA meeting in Poland Spring was *not* the doings of his office—In short, the "somebody who goofed" was the hotel.

★ ★ ★

Land of the Maple Leaf — In October, Virginia and I journeyed to Niagara Falls, Ont., to attend the meeting of the Canadian Institute on Sewage and Sanitation. What wonderful hosts Bert Berry and his staff are.—And did you know that (Please turn to page 118)



Threading cracked sewer in Georgia

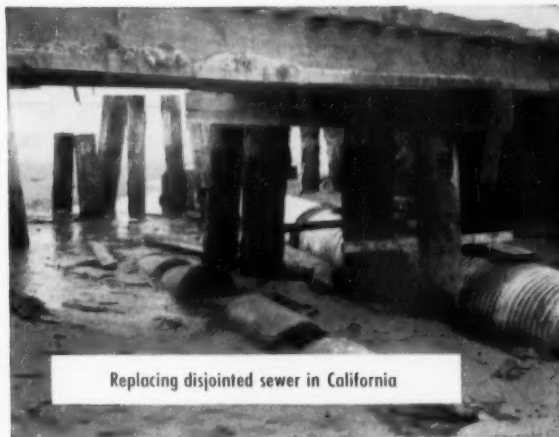


Relining failing sewer in Wisconsin

Which Armco sewer saved the most money?



Installing new Armco sewer in Ohio



Replacing disjointed sewer in California

Was it relining the failing sewer; threading the cracked pipe; replacing the disjointed structure; or installing an Armco Sewer in a brand-new installation? Fact is, they *all* saved plenty of money. But considering original costs, the *new* Armco Sewer will save much more through the years.

The new Armco Pipe will be faced with the same hazards that were disastrous to the other structures. But because of the flexible strength of corrugated metal, there is no danger of cracking. Positive bolted connections eliminate disjointing. And with Armco ASBESTOS-BONDED Pipe, the corrosive sewage will not cause damage. A long life for the new Armco Sewer is assured.

No two sewer problems are alike. But Armco can supply a structure to solve practically all of them. Armco Corrugated Metal Pipe and Pipe-Arch are recommended for normal sewer use; ASBESTOS-BONDED Pipe and Pipe-

Arch for severe corrosion problems; MULTI-PLATE Pipe, Arch and Pipe-Arch for large area requirements. For sizes and other factual details, write us. Armco Drainage & Metal Products, Inc., 1394 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. In Canada: Write Guelph, Ontario. Export: The Armco International Corporation.

Armco Sewer Structures



**WALK...
DRY!
SAFE!
CLEAN!**

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"DRYWAY"
GRATING**

**WALKWAYS and
STAIR TREADS**



IRVING GRATING

**Provides the perfect Dry,
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for Sewerage disposal
Plants. Gratings of Alu-
minum, Steel and other
alloys offer a minimum
of Maintenance Cost.**

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ESTABLISHED 1902

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UP FRONT FOR ADEQUATE ROADS

BY

LEO J. RITTER, JR.

New York University



A. G. C. Construction Forecast — The Associated General Contractors of America has predicted a continued high rate of construction activity in 1954, following the completion of an all-time record high \$46.5 billion in total construction in this country in 1953. Since the total estimated gross national product was some \$369 billion, more than one dollar out of every eight spent for end products and services was a construction dollar. According to the A. G. C., construction continued its postwar role as the nation's greatest single production activity and was responsible for the employment, directly or indirectly, of nearly 8.4 million persons. Major favorable factors for the immediate future of construction include the following: The continuing high level of plant and equipment expenditures planned by business; booming commercial construction; the increasing backlog of known planned construction projects; the trend of development in suburbs which carries with it the demand for all types of construction needed for community facilities; recent demonstrations of the public's willingness to authorize large bond issues to finance needed projects; and, finally, good economic conditions in general which, while tapering off slightly from boom conditions, show continued high employment, high production and peak income. Seems as though the A. G. C. isn't frightened by the possible activities of the "big, bad wolf" of recession, which are being talked of in some quarters.

Doings in the Sunshine State—Acting Governor Charley E. Johns of Florida, who took over the reins when Dan McCarty died suddenly last year, really is having himself a time. In the last few months he has suspended the state road board, the turnpike authority and two other commissions. Apparently, lit-

tle can be done about these actions, since the state legislature will not meet until 1955 and only the governor can call the legislature into special session. And we thought things were rough under Fuller Warren!

A.A.S.H.O. — We've been thinking some lately about the statement adopted by the American Association of State Highway Officials at its convention in Pittsburgh last November. As you may know by now, the Association recommended that annual authorizations of \$900 million be made by the Congress for federal aid for highways for the 1956 and 1957 fiscal years. Also the group abandoned its position of long years standing which called for the Congress to abandon the federal gasoline tax, leaving that field of taxation to the states. This, we feel, was a very wise decision, since it is bound to make for better relations between the group and the Congress. If we have judged the temper of the present administration correctly, fair attention will be given to the problem of increased federal aid for highways, although we are not at all optimistic about reaching the association's goal.

Professional Activity — Sometimes we wonder at the lack of professional activity among persons in the highway field. Every time we go to another national meeting, this is further impressed on us, since we seem to run into the same relatively small group of people each time. Then, too, it seems to be like pulling teeth to get many people in this field who have had interesting experiences and hold knowledge of many practical matters which would be of value to others, to write articles or present papers. One of the biggest problems of an editor (as we understand it, Colonel) is to find an adequate number of interesting papers to publish. Why don't each of you, personally, this year write an article, short or long, (Please turn to page 108)



Tandem Jaeger Spreaders lay new Tennessee material

18" of stiff base mix placed true to grade, ahead of weather

Tennessee's new base material is a dense and sticky pug-mill mixture of crushed limestone containing a high percentage of fines, calcium chloride and water. It looks and feels a lot like low slump concrete.

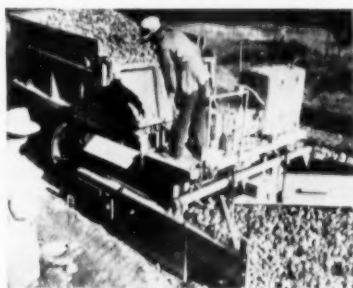
One of its first applications required Knoxville Construction Co. to place 18" of this material in three 6" courses. Each course had to be laid true to grade and cross section and rolled immediately to insure proper compaction and avoid weather hazard.

Two Jaeger self-propelled Aggregate Spreaders, used in tandem, placed parallel strips which could be rolled in one operation. A side bleeder gate, in the rear spreader, provided material for blending the lanes.

Straight-edge runners, carrying the spreaders' strike-offs, averaged out initial subgrade irregularities and placed the successive courses accurately to grade.

Placement by this method was so fast that progress depended entirely on material deliveries. Daily production varied from 3000 to 3300 tons. The two spreaders could easily have laid 6000 tons had the material been available.

If you have the job of laying any type of base or surface aggregate, plant-mixed stabilized soil or free-flowing bituminous material, accurately and at low cost, talk to your Jaeger distributor or send for Jaeger Aggregate Spreader Catalog SPS-1.



Laying stone without hand labor: Paul L. Britton, Inc. accurately placed 8-ton truck loads in 45 seconds, for highway base near Kinnard, Pa.



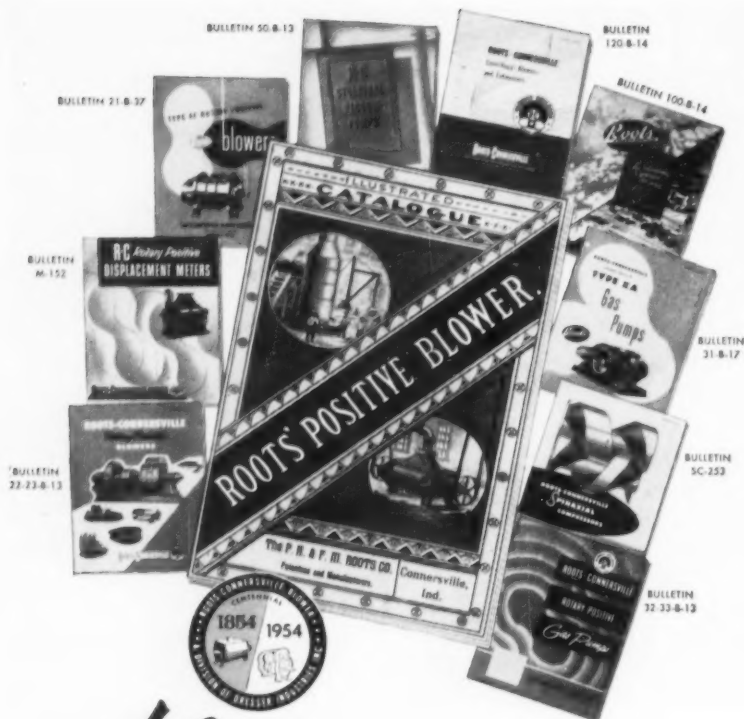
Laying Airport Base: Del Webb and San Xavier Construction Companies used Jaeger Spreader to place stabilized soil base for 200,000 sq. yds. of runway at Tucson Municipal Airport.

THE JAEGER MACHINE COMPANY

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CONCRETE SPREADERS and FINISHERS • AIR COMPRESSORS • PUMPS • CONCRETE MIXERS • LOADERS

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Keeping pace with industry for 100 years

This early "Roots" catalog, published in 1879, offered only Rotary Positive Blowers. That was our exclusive business at that time—25 years after the invention of the rotary positive principle by Francis M. Roots.

Today, because of the greatly increased use of gas and air for industrial purposes, it takes a great many bulletins and booklets to describe our expanded line of products. As new ideas, new developments are utilized in industrial processing, Roots-Connorsville keeps pace with new equipment to handle gas and air most effectively and economically. And that is still our only business.

Into these bulletins, any of which are yours for the asking, are condensed our 100 years of experience in building such equipment, from the first Rotary Positive Blower in 1854 to our latest 1953 development, the Spiraxial Compressor. They describe R-C products which are up to date in design and construction, to match specific needs of industry.

We suggest that when your business has a job of handling gas or air, you consult the exclusive specialist for 100 years.

Reg. U. S. Pat. Off.



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Now's the time to mail this month's Reader's Service card.

LETTERS TO THE EDITOR

AVAILABILITY OF FELLOWSHIPS

I would like information on the availability of fellowships in Sanitary Engineering. I am interested in earning a Master of Science Degree in this field. My particular interests lie in limnology and stream pollution. I have a BA degree, had three years of extended active duty in the Army and am now a chemist in a Class A district water quality control laboratory in Okinawa. I am due to return to the US in the late summer of 1954.

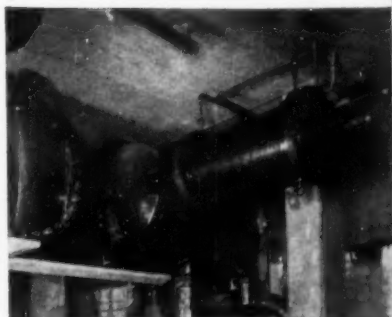
John B. Roberts,
Box 142, APO 331,
c/o Postmaster, San Francisco.

ROADS FOR TODAY'S TRAFFIC

I have your letter of October 13, 1953 with galley proofs of an article by George E. Martin on "How to Make Old Roads Fit for Today's Traffic", to be printed in your January 1954 issue of Public Works.

I do not take issue with the discussion of highway relocation, mud-jacking and other details of highway reconstruction. However, I believe we must face the fact that generally throughout the country it is not possible to make old roads fit today's traffic. This is particularly so in the urban areas where nothing short of the construction of new arterials requiring substantial funds will solve the problem.

We have almost fifty-five million vehicles on the roads today and more vehicles are rolling off the assembly lines daily. Traffic is so heavy that many of the methods described by Mr. Martin could not be carried out without completely disrupting the flow of traffic. I believe that the trouble in this country is that we have been doing just the type of highway relocation and

Cleveland*Kansas City***FOR**

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Emergency Shut Off
Frequent Operation
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Intake Towers
Sewage Disposal
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Indianapolis

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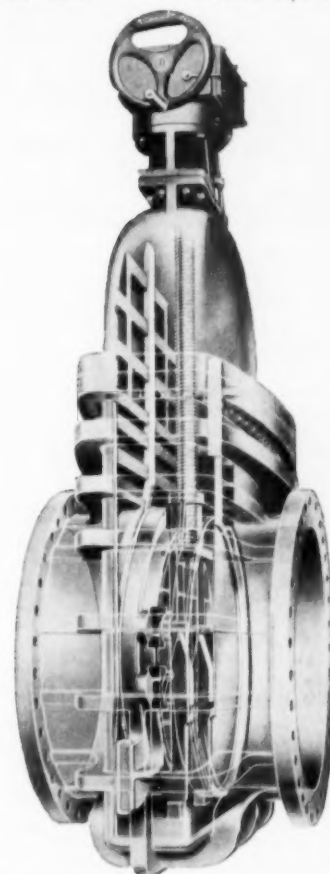
This is the valve with the three point support throughout the entire length of gate travel, which eliminates any tendency of the down stream gate to tilt.

The seat ring and the gate ring do not come in contact with each other, except in fully closed position.

This is the valve used extensively for frequent operation, emergency shut-offs, for filter plants and for throttling. It may be furnished in both single and double square-bottom construction.

Made in sizes ranging from 4" to 54" and up to 250 W.P. Ask for Bulletin No. B.

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HOMESTEAD

Self-Seald...Lubricated

PLUG VALVES

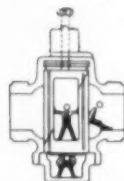
THEY GIVE LONGER SERVICE BECAUSE THEY

Automatically adjust for wear!

HOMESTEAD Self-Seald LUBRICATED PLUG VALVES provide lower-cost-per-year fluid control than any other valves within their service range. Extra long, leakless service, less maintenance and lower operating costs are assured by the exclusive, *self-sealing*, wedge-acting, two piece plug that *automatically adjusts* to make up for wear as wear occurs, thus keeping the seating surfaces of the plug and valve body in constant contact to maintain a perfect, drop-tight seal. Add to this the extra advantage of a full lubricant seal around the ports and the top and bottom of the valve, and you have the reasons why HOMESTEADS' are noted for lower replacement and maintenance costs. Specify "HOMESTEADS" on your next valve job, or slip them in on your next replacement.

We can furnish them in semi-steel or cast-steel, 100% Port Area or Venturi, in sizes $\frac{1}{4}$ " to 14", for steam working pressures to 150 lbs., or air—water—gas to 200 lbs. Also available in one piece plug design.

MAIL COUPON TODAY for VALVE REFERENCE BOOK No. 39-5
For local distributor see Yellow Pages of your Telephone Book.



Some "Self-Seald" Features

- Combines positive seating of tapered plug with operating ease of cylindrical plug.
- Leakproof triple head seal.
- Port area equal to 100% std. pipe area.
- All sealing surfaces protected from line fluids.
- Full threaded lubricant screw.
- Quarter turn opens or closes.
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Please send me VALVE REFERENCE BOOK No. 39-5 and price list of Homestead Self-Seald Lubricated Plug Valves.

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reconstruction as described by Mr. Martin rather than to face the issue and build the type of artery which will give us a measure of relief. If we are to obtain the support of the public and legislators, the publications reporting on public works will have to get behind a program.

I assume that you received a copy of the General Motors highway essays. In any event, attached is another copy which may be of some use to you.

Robert Moses,
Construction Co-Ordinator
New York City, N. Y.

BOOKS IN BRIEF

KNOW YOUR HIGHWAY COSTS

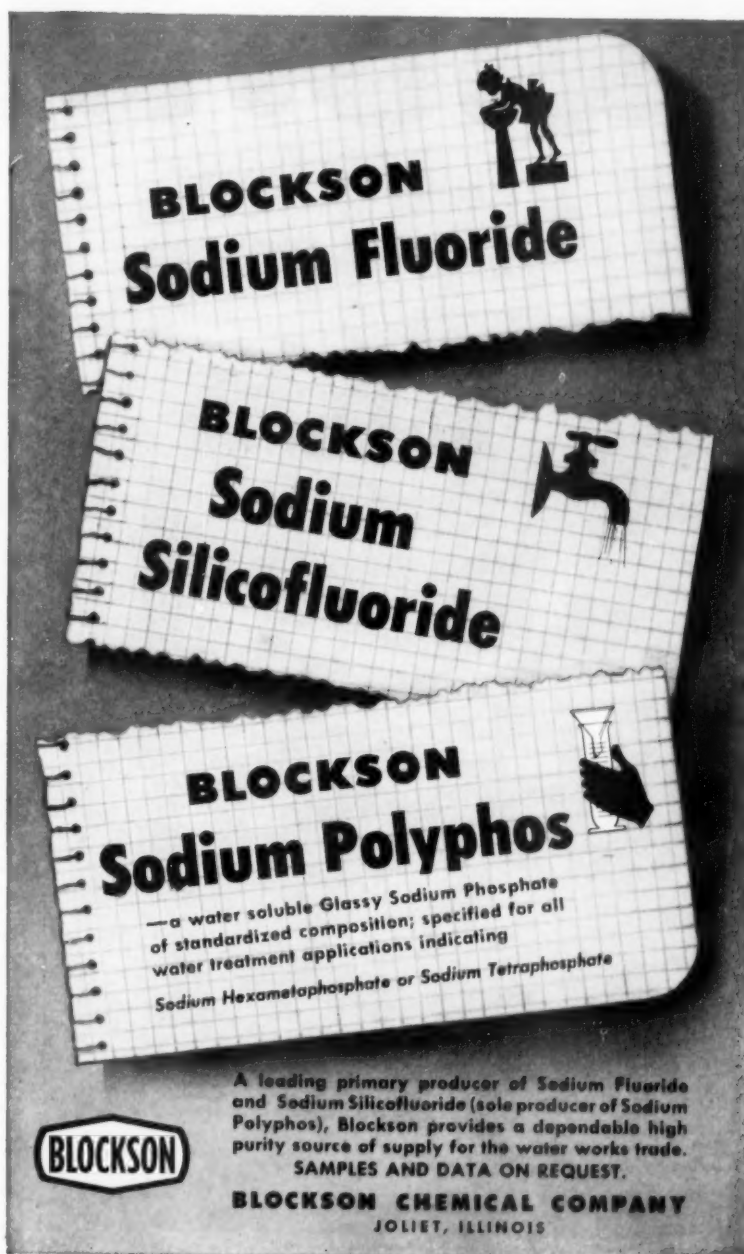
Special Report 13 of the Highway Research Board describes the use of highway control sections for keeping adequate cost and operating records of the highway plant; 30 pages; paper bound. Available from the Highway Research Board, 2101 Constitution Avenue, Washington, D. C.

GAS AND VAPOR ABATEMENT

This is Chapter 10, published separately, of the Air Pollution Abatement Manual which is being prepared by the Manufacturing Chemists' Association, Woodward Bldg., Washington, D. C. This installment, prepared by R. J. Jenny of American Cyanamid, deals with the methods of abating pollution from gases and vapors. 29 pages. From the Association, 60 cents.

FIELD TRAINING FOR SANITATION PERSONNEL

This is a guide to field training for sanitation personnel in public health. It was prepared by the Subcommittee on Field Training of the Engineering Section of the APHA, with William C. Gibson as chairman. In its 37 mimeographed pages it covers types of personnel to be trained; principles of field training; criteria for training areas; administration and supervision in training; financing and evaluation of results. It is an excellent text—as would be expected from the personnel that prepared it—and it ought to be in the hands of every health department. For copies write to W. C. Gibson, School of Public Health, University of Michigan, Ann Arbor, Mich.



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—a water soluble Glassy Sodium Phosphate of standardized composition; specified for all water treatment applications indicating Sodium Hexametaphosphate or Sodium Tetraphosphate

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BLOCKSON CHEMICAL COMPANY
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U.S. 52

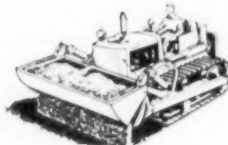
REFUSE IS SPREAD and compacted by an INTERNATIONAL TD-14A and Drott Bullclam at the Minot, North Dakota, sanitary landfill site.



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They're using rubbish to build the right of way for possible relocation of U. S. Highway 52 at Minot, North Dakota. And they've eliminated all complaints about old-fashioned, open dump refuse disposal at the same time.

"We didn't know what a kind word was until we put an INTERNATIONAL-Drott Bullclam to work for us," states Vern Fahy, Director of Public Works for the City of Minot.

"But we've had nothing but compliments since we started."

"No more rats, odors, smoke or fires. And we're dumping nearly 175 tons of refuse and ashes at our fillsite every working day."

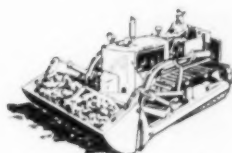
"We're getting two jobs done for the price of one with the INTERNATIONAL-Drott Bullclam on our sanitary landfill project."

"I'm sold on this method of sanitary landfill. It just can't be beat."

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4. Grades and levels
finished area.



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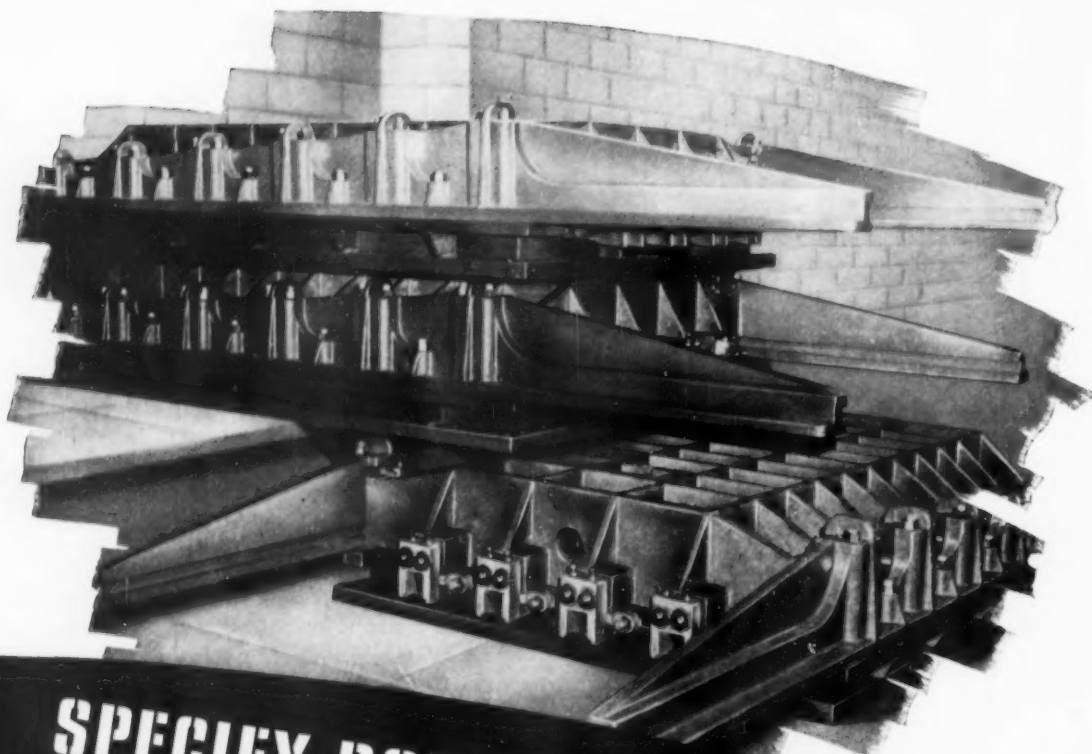
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Standard Sizes: 6" to 108" diameter

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Illustrated are three 72" x 96" bronze-mounted sluice gates; part of a 300,000-pound shipment to the U.S. Corps of Engineers for high-head use. This is only one of 2000 sluice gate combinations that can be ordered directly from the Rodney Hunt catalog!

With new equipment and enlarged facilities we can bid competitively with firm delivery on a wide range of gates. Modern foundry practice and precision finishing make Rodney Hunt sluice gates an important, low-maintenance asset to any water control project.

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This is one of the most complete works in the field. It contains photographs, drawings, specifications and complete descriptions of our sluice gates, timber gates, hoists, valves, racks and rakes, plus a valuable 28-page section of engineering data on hydraulic problems.

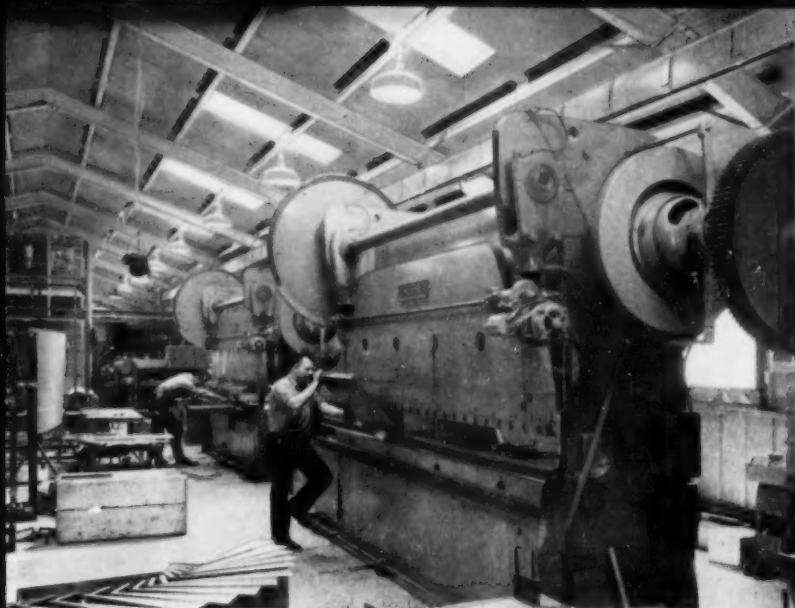
This important catalog was specially prepared and edited for consulting engineers, contractors and other executives who are *actively* engaged in the water control field. Please write on your letterhead for Catalog WCA-952, Rodney Hunt Machine Co., 82 Lake St., Orange, Mass., U.S.A.



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Battery of press brakes in the complete new plant of Lake Shore Electric, Inc., Bedford, Ohio. Butler steel buildings were used throughout . . . saved half the cost of new construction . . . gave Lake Shore a more efficient, better lighted, safer plant.

Buildings too work harder, earn more— when they're **BUTLER** steel buildings

Take a look at the performance of the new Butler-built plant erected for the Lake Shore Electric, Inc., Bedford, Ohio. They formerly occupied 30,000 square feet in a 4-story building—then "expanded" to a 1-story 23,300 square foot rigid-frame Butler steel building.

Production increased! Here is how Mr. S. W. Soos, President of Lake Shore Electric, explains it, "There is less waste motion now that everything here is on one floor. Post-free Butler construction also lets us place machines and materials for the most efficient work flow. Employees appreciate the soft, natural lighting from the Lite*Panels, and overall efficiency is improved by the convenience of our new layout. Yet square foot cost was considerably less than the cost of many common types of construction—only \$6.00 per square foot *including* insulation, lighting and even overhead cranes."

Build better—for less money—with Butler steel buildings. They give you every advantage of conventional construction *plus* these profit-producing extras: (1) Your capital investment is lower, (2) Faster erection time puts you in production earlier, (3) steel or aluminum sheeting lowers maintenance costs, (4) pre-engineered Butler buildings do not become obsolete—you can profitably expand, alter or relocate them at any time to meet new demands of our fast-changing economy. Write today for full particulars about Butler buildings and the name of your nearest Butler dealer.



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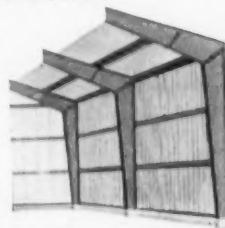
7321 East 13th Street, Kansas City 26, Missouri
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Manufacturers of Oil Equipment • Steel Buildings • Farm Equipment • Cleaners Equipment • Special Products
Factories located at Kansas City, Mo. • Birmingham, Ala. • Richmond, Calif. • Galesburg, Ill. • Minneapolis, Minn.

Here is why **BUTLER** is a better buy

Every Foot of Floor Space is Usable

There are no interior posts or columns to waste space and create work-slowng "bottlenecks." Rigid-frame construction also shrinks maintenance costs . . . extends building life.



Fast Erection . . . Easy Expansion

Precision-punched and dimensioned bolt holes speed erection—simplify expansion or dismantling and moving. Galvanized bolts, with Neoprene rubber washers, lock deep-corrugated sheets firmly to the sturdy frame.



Weatherproof Protection

The one-piece, die-formed roof ridge eliminates ridge roll—helps to make the building leakproof and weather-tight.



Triple-Strength Corrugated Sheets

Butler sheeting, with deep-drawn corrugations formed on 12-inch centers, is three times as strong as ordinary corrugated sheets. Overlapping corrugations bolt tightly together for maximum strength and weather protection. Available in steel or aluminum.



Attractive Curved Eaves

The neat, die-formed eaves—which bolt to the roof sheets—add to the appearance of Butler steel buildings . . . increase the strength of the eaves . . . help insure weather-tightness.



Weather-sealed Windows and Base

Where corrugated sheets meet windows or the foundation, they are tightly crimped for a snug fit that keeps out snow, moisture and rodents.



For Quickest Pipe Threading
by hand...it's "OOR"

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Popular Extra-Handy OOR Threads $\frac{1}{8}$ " to 1" Pipe Fast and Easily

- You just can't beat these small drop head dies for quick easy pipe or conduit threading.
- Snap the size head you want into the drive ring, from either side, and you're ready to cut clean perfect threads . . . heads can't fall out.
- Precision-cut alloy dies reverse easily for close-to-wall threads—no special dies needed.
- OOR and OR $\frac{1}{8}$ " to 1"; 111R and 11R, $\frac{1}{8}$ " to $1\frac{1}{4}$ "; 12R, $\frac{1}{8}$ " to 2". Free carrier with sets. Every threader fully work tested before shipment. Buy them at your Supply House.

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LEADERS IN PUBLIC WORKS



Kenneth K. King, since 1950 Public Works Director for the City of Phoenix, Ariz., has had a long and varied career in engineering. A graduate of the University of Missouri with a BS in Engineering, he was designing and supervising engineer for Fuller & McClintock in New York; a sanitary engineer with the Public Health Service; engineering section chief for the Farm Security Administration in Washington, and later a district engineer; director of the Water Department and later director of Public Works for Kansas City, Mo.; and General Manager for C. S. Foreman Co., general contractors. His duties in Phoenix include administration of the Public Works Department, including utilities, airports, water, sewerage and sewage treatment, transportation, traffic engineering, buildings, streets, refuse disposal and other usual public works duties.

In addition to being vice-president (Western Area) of APWA, he is a member of ASCE, AWWA, NSPE, ASPE and other technical and service clubs and associations. He and Mrs. King have two children, a son now taking post-graduate work at Caltech and a married daughter in Virginia. His hobbies are reading and photography. His primary interests are the problems at Phoenix, where water facilities are now being expanded to 74 mgd capacity; and where the Sky Harbor Airport and the City transit system are entirely self-supporting.

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- ONE-MAN OPERATION
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Exclusive "CENTER-SPRED" DESIGN gives VISIBLE SPREAD...POSITIVE TRACTION

✓ COMPLETE HYDRAULIC OPERATION

Both width and amount of material spread are now controlled right from the truck cab. This is achieved by two independently operated hydraulic motors. One drives the drag chain (the speed of which controls the amount of material). The other drives the distributor (the speed of which determines the width of spread).

✓ NEW IMPROVED "CENTER-SPRED" PATTERN

Located between front and back wheels on driver's side, the distributor spreads material in front of all four wheels. Result: perfect traction for Spread-Mobile, complete visibility and control of spread. Baffles can be added to control spread so it is predominantly to the driver's side or curb side.

✓ ADAPTABLE TO YEAR 'ROUND OPERATION

The Spread-Mobile can be used for ice-control in winter; in summer for such road maintenance work as oil-blotting, shoulder maintenance, etc.

HEAVY-DUTY POWER UNIT

Including 14-hp T.F. Wisconsin Gas Engine with all controls in truck cab.

EXCLUSIVE EXHAUST HEAT PREVENTS FREEZING

Patented chamber utilizes exhaust heat; prevents load freezing, aids penetration.

SPLIT-BOTTOM DUMP ADDS USEFULNESS

Adaptable in off-season periods to many of the functions of general dump body.



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BAUGHMAN MANUFACTURING CO., Inc.
222 ARCH STREET • JERSEYVILLE, ILLINOIS

Preventing high-volt leaks with PERMUTIT demineralized water

THE 75' diameter atomic accelerator shown below has five times more power than any other. Its 2200 ton electromagnet quickly whips particles three million times 'round the race-track to an energy approaching 3 billion electron volts.

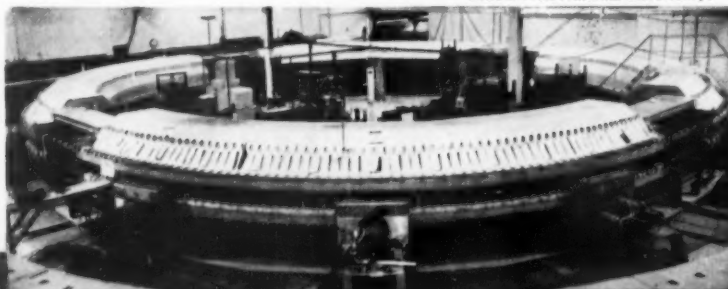
Packing all this power into a reasonable-size unit was a problem. Size ruled out air cooling. So the bus-bar magnet coil was made for circulating cooling water.

But at 3,000 volts, the dissolved minerals in *untreated* cooling water could conduct electricity, causing appreciable leakage to grounded piping. A means had to be found for producing water purer than conventional distilled water—at low cost.

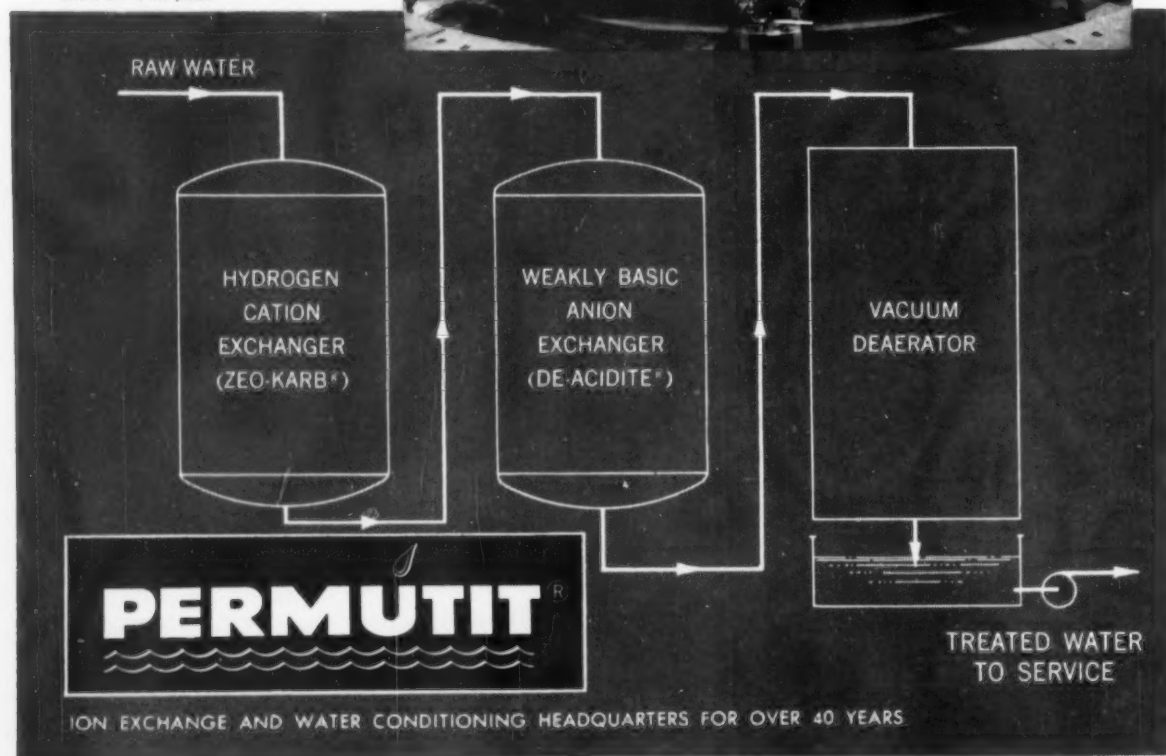
A Permutit Demineralizer was selected (*see diagram*). Cooling water recirculated through this ion exchange unit approaches the very low conductivity of pure water, hence it has been completely effective in removing dissolved solids.

Find out how Permutit can solve your water problems. Write to THE PERMUTIT COMPANY, Dept. PW-2, 330 West 42nd Street, New York 36, N. Y., or Permutit Company of Canada, Ltd., 6975 Jeanne Mance Street, Montreal.

The giant Cosmotron at
Brookhaven National Laboratory.



Permutit two-step Demineralizer with
Vacuum Deaerator. Troublesome cation
impurities are removed in the first step,
remaining minerals in the second, oxygen
and CO₂ in the final.



Now's the time to mail this month's Reader's Service card.

Norfolk Prefers Concrete Pressure Pipe



Since 1921, Norfolk, Virginia, has been specifying concrete pressure pipe for its water supply and distribution system. Over 450,000 feet of pipe is now in use. Diameters range from 20" to 48".

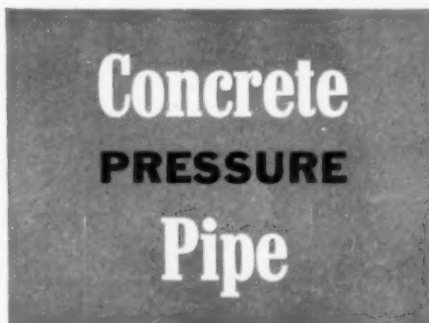
Still in excellent condition is the 31,700 feet of concrete pressure pipe laid in 1921. There has been no necessity to take this pipeline out of service for any



maintenance work; nor has the pipeline suffered from any trouble due to electrolytic action. This pipe is now carrying water at the same high capacity as when it was installed.

If your city wants pipe with an assured high-carrying capacity, decade after decade . . . if long term economy is a necessity . . . then look into the advantages of concrete pressure pipe when you plan your next transmission or distribution lines.

*Member companies manufacture
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in accordance with
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NEW LISTINGS

Think of Aerial Surveys When You Need Maps

311. Every engineer and public official should investigate aerial surveys for maps of new areas, up-to-the-minute maps for city planning, highway relocation, surveys to plan extensions of sewers, water mains and utilities. Precise contours for topographic maps and other data in any detail desired can be furnished by Aero Service Corp., 236 Courtland St., Philadelphia 20, Pa. Interesting booklet on aerial mapping services and methods available by checking the coupon.

Helpful Data on Water Meters

330. It is to the interest of every water works superintendent and engineer to have full data on dependable Badger water meters and related meter products. Complete data on all types of disc, turbine and compound meters, meter test equipment, yokes, strainers and alarm registers are supplied in an attractive binder by Badger Meter Mfg. Co., Milwaukee 45, Wis. Check the coupon for your copy.

Get Comprehensive Data On Johns-Manville Products

338. A new 40-page Industrial Products Catalog which offers essential data on asbestos-cement pipe, packings, insulations, construction materials and numerous other products is now available from Johns-Manville, 22 East 40th St., New York 16, N. Y. You will find this compact catalog a valuable reference item. Check the coupon for a copy.

How "Servisafe" Units Offer Easier Lighting Maintenance

208. Latest data on Thompson "Servisafe" units which allow luminaire servicing to be done at ground level, eliminating all climbing and electrical hazards, will be found in 32-page catalog No. PB53, issued by Thompson Electric Co., 1111 Power Ave., Cleveland 14, Ohio. Full descriptions of operating mechanism and safe working procedures and details on single and double arm metal pole units and brackets are included. Check the coupon for this comprehensive booklet.

The engineering information in these helpful catalogs will aid you in your Engineering and Public Works programs. Just circle numbers you want on the coupon, sign and mail. This free Readers' Service is restricted to those actively engaged in the public works field.

What is Ion Exchange? Here Are the Answers

64. An excellent presentation of the fundamentals of ion exchange and its application to water conditioning is available in a new 16-page booklet "Amberlite Ion Exchange," published by Rohm & Haas Co., Resinous Products Div., Washington Sq., Philadelphia, Pa. Fundamental ion exchange processes, chemical reactions in water softening and demineralization and many applications are clearly described and illustrated. Check the coupon for a copy.

Safety Lantern With Pencil Beam Signal

70. Get information on the Dietz "Night Watch" Safety Lantern with special globe design that saves fuel by intensifying light rays into a pencil beam. Full details available from R. E. Dietz Co., Syracuse, N. Y. Just check the coupon for full data.

Effective Shredder For Dried Sewage Sludge

72. The rugged and compact Royer Sludge Disintegrator does a quick and effective job of preparing sludge for use as a fertilizer on city properties or for sale to others. Several models, portable and stationary, suitable for every size plant and power source are described in Bulletin 643-A, issued by the Royer Foundry and Machine Co., Kingston, Pa. Get a copy by checking the coupon.

What Chemicals and Apparatus Does a Laboratory Need?

73. In two convenient check-off lists compiled by Central Scientific Co., 1700 Irving Park Rd., Chicago 13, Ill., the chemicals and apparatus needed for nearly 100 tests used in water and sewage analysis are indicated. These lists are useful for all operators, designers and contractors. Check the coupon for your copies.

Meters and Instruments For Water Works

43. An attractively arranged 20-page booklet issued by Sparling Meter Co., Box 3277, Los Angeles 54, Calif., furnishes concise data on the full line of Sparling meters, indicator-totalizer-recorder instruments and other special instruments and controls. Check the coupon for your copy.

Engineering Data on Disc Feeder for Dry Materials

57. The Omega Model 50 Disc Feeder for accurate and continuous feeding of dry materials at low rates is described in Bulletin 50-K57, issued by Omega Machine Co., 345 Harris Ave., Providence, R. I. Adjustable in feed range from 20 to 1700 cu. in. per hour, this self contained, readily portable unit finds wide application in feeding practically any granular or powdered dry material. Get full data by checking the coupon.

Meter Features That Help Make Water Works Profitable

59. Simple design, accuracy and long life, moderate first cost and inexpensive maintenance are features of American water meters described in Bulletin No. 50 of the Buffalo Meter Co., 2917 Main St., Buffalo 14, N. Y. Be sure you have this informative booklet which gives the details of American meter design and construction plus full data on sizes, capacities and dimensions. Get your copy by checking the coupon.

FOR MORE LISTINGS
SEE PAGES 34 TO 50

Reference Catalog for Valves, Fittings and Hydrants

125. Complete data on gate valves for all services, operating accessories, check valves, fire hydrants and related specialties plus a reference section of useful engineering data is contained in Catalog H-1 issued by Kenschler Valve Co., Troy, N. Y. All engineers who specify valves, fittings, and hydrants should have this valuable catalog for ready reference. Check the coupon.

Catalog H₂O for Data on Water Storage and Processing Vessels

128. Every type of water storage vessel—standpipes, reservoirs, elevated tanks and spheres—several installations of filtration and purification plant units are described and illustrated in Catalog H₂O recently issued by Hammond Iron Works, 630 Fifth Ave., New York 20, N. Y. Design details and data on sizes and capacities are included in this attractive bulletin. Check the coupon for your copy.

Velocity-Power Tools Drive Steel Studs

133. Full data on the Velocity Power Model "P" Driver, a portable power-actuated tool for driving steel studs into steel, concrete or masonry is provided in Bulletin 1401-2 of the Velocity-Power Tool Co., 201 No. Braddock Ave., Pittsburgh 8, Pa. To find out how this tool will speed the work on large and small construction jobs just check the coupon.

2-34

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327 330 332 333 335 338 342 348 350

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Modern Methods and Materials For Joining Sewer Pipe

227. In a compilation of reprints and related supplementary material, the Atlas Mineral Products Co., Mertztown, Pa., presents a comprehensive review of all types of sewer jointing materials and methods. You will find this interesting and informative reading. Get a copy by checking the coupon.

How to Get Warning Of Bad Weather Conditions

241. State, county and municipal officials have found that accurate forecasts of snow and ice conditions, as well as forewarnings of other weather factors helps them plan their maintenance work with much greater ease and effectiveness. The story of weather forecasting and reporting services is told in an interesting booklet available from Weathercasts of America, 611 Olive St., St. Louis 1, Mo. Check the coupon for your copy.

WATER WORKS

The Modern, Streamlined Elevated Tank

32. An 8-page bulletin describes the Watersphere, a modern elevated water tank of welded steel construction for general service gravity water pressure and fire protection. Construction details, illustrations of typical installations and table of standard sizes from 25,000 to 250,000 gallons capacity are included. Check the coupon. Chicago Bridge & Iron Co., 2115 McCormick Bldg., Chicago 4, Ill.

Design Data on Chemical Flocculating Equipment

89. Flash mixers, Straightline mixers, conveyors and elevators for handling chemicals are described in an illustrated bulletin now available from Link-Belt Co., Colmar, Pa. Selection tables and diagrams are provided to help you select the equipment best suited to your needs. Check the coupon for your copy.

Data on Cutting-In Valves, Repair Sleeves and Accessories

33. A variety of Clow products for installation and repair of cast iron pipe lines, including the Eddy cutting-in valve and sleeve, split sleeves for pipe repair, test plugs, valve boxes, Strickler pipe cutters and other fittings and accessories are featured in literature available from James B. Clow & Sons, Inc., Box 4600-A, Chicago 80, Ill. Check the coupon.

Technical Data on Fluorides And Other Chemicals

48. Technical data on fluorides and other chemicals will be found in a comprehensive booklet issued by Blockson Chemical Co., Joliet, Ill. This helpful 60-page booklet includes a great deal of general information of value to water works men. Get a copy by checking the coupon.

Helpful Data on Water Works Products

49. A completely new catalog covering the entire line of water distribution and service products offered by the Mueller Company, of Decatur, Ill., is now available to engineers and water works superintendents. The 328-page catalog features an easy-to-use sectional indexing arrangement to facilitate quick reference to any of the hundreds of products listed. A large section of useful engineering information is included. Check the coupon today.

How Engineers and Contractors Can Get This Comprehensive Water Control Apparatus Catalog

141. A 250-page catalog showing the full scope of Rodney Hunt water control apparatus is now available for distribution to consulting engineers, contractors and others actively engaged in water control construction work. Hundreds of diagrams, detailed descriptions and specifications show all types of sluice gates and related items, and a special section provides helpful engineering data. Send your request on business letterhead or use the coupon, stating your occupation. Rodney Hunt Machine Co., 7 Water St., Orange, Mass.

Reconditioning Pipe Lines With Cement-Mortar Linings

80. Pipe lines from 4 to 144 inches in diameter can be cement lined in place by the Centriline and Tate Processes. Catalog 9-52-5M describes how this operation gives new pipe line performance for a fraction of the cost of new pipe and shows how the work is done. Check coupon for your copy. Centriline Corporation, 140 Cedar St., New York 6, N. Y.

Rapid Sand and Pressure Filter Data

109. Rapid sand filters. A complete line of vertical and horizontal pressure filters, wooden gravity filters, and filter tables and other equipment. For engineering data, write Roberts Filter Manufacturing Co., 640 Columbia Ave., Darby, Pa.

Specs for Gate Valves

112. Rigidly inspected gate valves for pressures up to 175 lbs. by R. D. Wood Co. Sizes 2" to 30"; for any standard type joint. R. D. Wood Co., Public Ledger Bldg., Philadelphia 5, Pa.

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Helpful Data on Mechanical Joints

138. Get Circular 49 from M & H Valve & Fittings Co. for important information and installation dimensions of M & H AWWA Mechanical Joint Valves and Hydrants. Features include ease of installation, construction economy, long life. Use coupon or write M & H Valve & Fittings Co., Anniston, Ala.

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Fleets Liquid Level Controls

92. Complete descriptions of electrode type floatless liquid level control systems, including control units, electrodes and fittings, panel assemblies and diagrams of typical installations for all types of municipal service are covered in the 32-page catalog of Charles F. Warrick Co., 1956 W. Eleven Mile Rd., Berkley, Mich. Check coupon for your copy.

How to Top Concrete Pressure Pipe

126. The simple steps required in making a pressure tap in concrete pressure pipe are explained in a booklet issued by Lock Joint Pipe Company. Be sure you know how either large connections or small service outlets may be made economically and without sacrifice of strength. Just check the handy coupon. Lock Joint Pipe Co., Box 269, East Orange, N. J.

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Faster Pipe Laying With Precast and Threaded Joints

148. McWane 2" cast iron water pipe with threaded joints and precast bell and spigot pipe are described in folder WM-47. Additional data on 3" to 12" centrifugally cast pipe and fittings in folder WL-47, both issued by McWane Cast Iron Pipe Co., Birmingham 2, Ala.

What You Should Know About Fluoridation and Fluoridators

185. Two helpful publications issued by Wallace & Tiernan titled "Fluoridation" and "Fluoridators" show the development of fluoridation, list the chemicals and dosage normally used, and give full technical data on solution feed and dry feed fluoridators. Be sure to get these publications from Wallace & Tiernan by checking the coupon today.

164. Built to stand the most severe service, the all-purpose Ellis & Ford pipe cutter is easy to use in tight places, works in or out of trench. Full details on cutter and interchangeable parts in Catalog 25, available by checking coupon. Ellis & Ford Mfg. Co., Ferndale 20, Mich.

Heavy-Duty Pipe Cutter Works In or Out of Trench

165. Convenience and accuracy are key notes of the Aqua Valve Box locator describes in a full-color folder offered by Aqua Survey and Instrument Co., 2518 Leslie Ave., Cincinnati 12, Ohio. Cobalt alloy steel dipping needle is factory-set for any geographic location. Periscope type mirror arrangement permits effortless top reading. Get full details by checking the coupon.

Avoid Needless Digging With This Valve Box Locator

116. A very interesting study of municipal and industrial water supply problems and a complete discussion of Ranney Collectors for water production will be found in a 20-page booklet published by Ranney Method Water Supplies, Inc., Box 277, Columbus 9, Ohio. Water quality, construction methods, costs, performance and other topics are considered. Check the coupon to get your copy.

Discussion of Ranney Method For Municipal Water Production

170. The complete line of gravity filters and related accessories furnished by the Permutit Co., New York 36, N. Y., is covered in a well-illustrated 24-page booklet. Each element of a filter and filter controls are discussed in detail to assist the designer of these important units. Get your copy of this helpful publication by checking the coupon.

Engineering Data On Gravity Filter Design

322. For complete details on all equipment and proper methods for meter testing and installation are included in an excellent book published by Ford Meter Box Co., Wabash, Ind. All waterworks men concerned with setting and testing of water meters should have a copy of this book. Write for Catalog No. 50.

What You Should Know About Meter Setting and Testing Equipment

322. For complete details on a heavy duty, positive displacement, diaphragm type pump for accurate feeding, chlorinating and fluoridation solutions, get Bulletin PM 20 issued by Precision Machine Co., 5 Union Sq., Somerville 43, Mass. Use the coupon today.

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Job Data Offered on New Steel Water Mains

Controller Maintains Water Level in Treatment Basins









348. Instrumentation which maintains liquid level in sedimentation basins, and thus controls level in succeeding treatment basins, is described in Application Engineering Data Sheet No. 831-20, issued by The Foxboro Co., Foxboro, Mass. All components are described in the illustrated data sheet. Get your copy by checking the coupon.

Controller Maintains Water Level in Treatment Basins

348. Instrumentation which maintains liquid level in sedimentation basins, and thus controls level in succeeding treatment basins, is described in Application Engineering Data Sheet No. 831-20, issued by The Foxboro Co., Foxboro, Mass. All components are described in the illustrated data sheet. Get your copy by checking the coupon.

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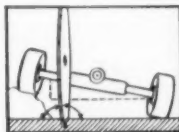
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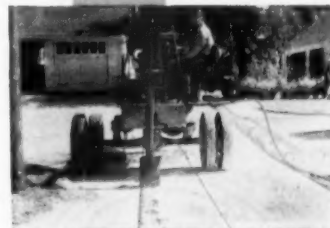
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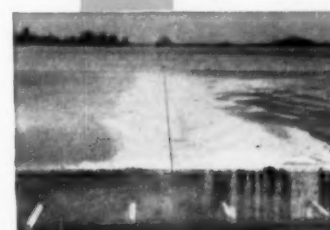
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Get This Helpful Data On Valve Boxes

187. Full details on service, roadway and valve boxes, meter boxes, frames and covers are included in Bulletin 2000 issued by Alabama Pipe Co., Anniston, Ala. All standard sizes are listed, together with prices, and instructions are furnished for handling special designs. Check the coupon for your free copy.

Trenching Made Easy With Hydraulic Dragshovel

214. The Bucyrus-Erie "Hydro-Hoe", a completely hydraulic dragshovel has two separate digging actions to dig a level, scallop-free trench and greatly reduce hand trimming. Be sure to investigate this rugged, easily operated machine. For details write Bucyrus-Erie, Hydrocrane Div., So. Milwaukee, Wis., or check the handy coupon.

Helpful Valve Catalog For Engineers

236. For complete descriptions of Darling double disc, parallel seat gate valves be sure to get Bulletin 5002 issued by Darling Valve & Mfg. Co., Williamsport, Pa. Construction details covering all valve parts and accessories are helpful for specification writers. Check the coupon for your copy.

Efficient Underdrains for Rapid Sand Filters

239. Be sure you have engineering data on vitrified clay underdrains, efficiently designed for filtering and backwashing. Check the coupon or write F. B. Leopold Co., Inc., Dept. F.W., 2413 W. Carlson St., Pittsburgh 4, Pa.

Standard Specifications for C. I. Pipe and Fittings

278. Standard dimensions for cast iron water pipe and special castings are available in a convenient booklet offered with the compliments of U. S. Pipe and Foundry Co., Birmingham 2, Ala. Get your copy by checking the coupon.

Now Every Municipality Can Own a Trencher

173. The low cost of the Blackhawk Trench Hog, a tractor-mounted ladder type trencher makes it profitable for many municipalities to own their own trencher. Be sure to investigate this versatile machine which digs trenches to 8 feet deep, 20 inches wide. Illustrated bulletin available from Arpa Corp., New Holstein, Wis. Just check the coupon.

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180. Every type of swimming pool equipment—boards, ladders, slides, safety equipment and related accessories—fully described and illustrated in attractive folder issued by American Playground Device Co., Anderson, Ind. All units feature modern design and superior construction to give lifetime service. Check the coupon for this attractive folder.

Helpful Data On Valve Boxes

291. Bulletin 35 issued by Buffalo Pipe & Foundry Co., Box 55, Sta. B., Buffalo, N. Y., gives full details on adjustable valve boxes, extension boxes and roadway boxes for water and gas. Get your copy by checking the coupon.

What You Should Know About Turbine Pumps

294. In a colorful bulletin titled "Water Where You Want It . . . When You Want It" the Johnston Pump Co., Bin "K", Pasadena 8, Calif., gives details on turbine pumps with both semi-open and closed impellers; oil or water lubrication; and adaptations for any power source or combination thereof. Get your copy of bulletin 1013 by checking the coupon.

Cleaning Service for Every Type of Pipe Line

302. Flexible Pipe Cleaning Co., operating with specialized equipment and trained crews, is prepared to remove scale, rust and

other deposits from pipes for every type of service. For details and estimates furnished without obligation write Flexible Pipe Cleaning Co., Box 167, Los Nietos, Calif. or check the coupon.

Technical Bulletin on Solenoid Operated Valves

288. Full technical data on applications, construction, dimensions and specifications of Golden-Anderson Cushioned solenoid operated valves is contained in Bulletin W-7, available from Golden-Anderson Valve Specialty Co., 207 Keenan Bldg., Pittsburgh 22, Pa. Selected valve patterns are offered in 1/2 to 2-in. and 2 1/2 to 36-in. sizes. Get all the details; just check the coupon.

Design Data for Hardness, Turbidity, Color or Algae Removal

253. Bulletin No. 9041 published by The Dorr Co. furnishes design data on the Hydro-Treater for high-rate, upflow type treatment of municipal and industrial water supplies. 32 pages include distinguishing features of the unit, types and sizes, capacity ratings and typical operating results. Get your copy of this helpful bulletin by using coupon today. The Dorr Co., Barry Pl., Stamford, Conn.

Inexpensive Crane For Water Department

261. Handling pipe, hydrants and valves; form pulling; and many other jobs that require a light-weight, economical crane can be solved with the versatile Pitman Hydra-Lift, an inexpensive crane that fits on the frame of any 1 1/2 ton or larger truck. Get the full story by checking the coupon. Pitman Mfg. Co., 300 W. 79th Terr., Kansas City, Mo.

General Catalog on Measuring and Controlling Equipment

272. The full line of Simplex equipment for the measurement and control of liquids and gases in water and sewage plant installations is illustrated and described in detail in 28-page Catalog 003. Every engineer should study the design data in this helpful booklet. Write Simplex Valve & Meter Co., 68th & Uplands Sts., Philadelphia 42, Pa., or use the coupon.



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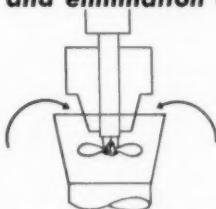
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In Sludge Digestion... you need all 4!

Effective, two-stage, sewage sludge digestion involves far more than just a heated tank! There are four major — and interrelated — requirements.

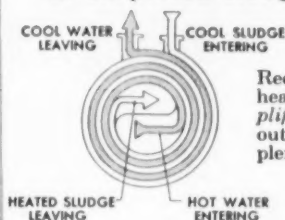
Here they are . . . and here's what you need to meet them . . .

1. Homogeneous mixing and elimination of scum



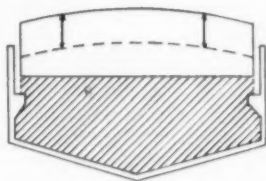
Calls for intensive mixing in the Primary by means of high-capacity propeller and draft tube.

2. Simplified Sludge Heating



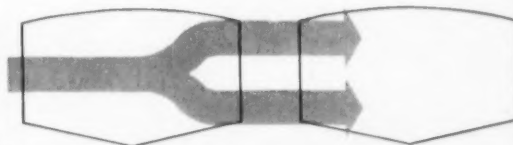
Requires an efficient heat exchanger of *simplified* design . . . without excessive and complex instrumentation.

3. Adequate Gas Storage



Demands a Secondary equipped with a movable, steel dome gas holder to even out fluctuations and insure a constant supply to gas utilization equipment.

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Requires a simple and automatic means of transferring sludge and liquor from the Primary to the Secondary at rate of feed.

Most important of all . . . you need a balanced and integrated System to meet these needs economically. Not an expensive conglomeration of unrelated units.

It will pay you to avoid the "piecemeal" approach. As proof, we suggest you compare the characteristics of Dorr Multidigestion* with any other digestion equipment.

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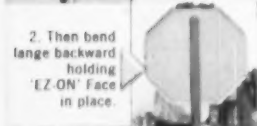
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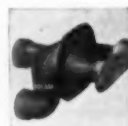
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INJECTOR SUPPLY FITTINGS
provide constant mixing of the
entering fresh water with the
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venting "dead spots" in the pool.



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provide continuous drainage of
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charge velocity of the grate area
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and other exclusive fittings de-
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• Regardless of the type of pool you build, you will want to secure maximum safety and maintain the highest health standards and hygienic conditions for bathers. To accomplish this, you must know certain basic facts about water supply, circulation and drainage as well as purpose, size, shape and location of pools.

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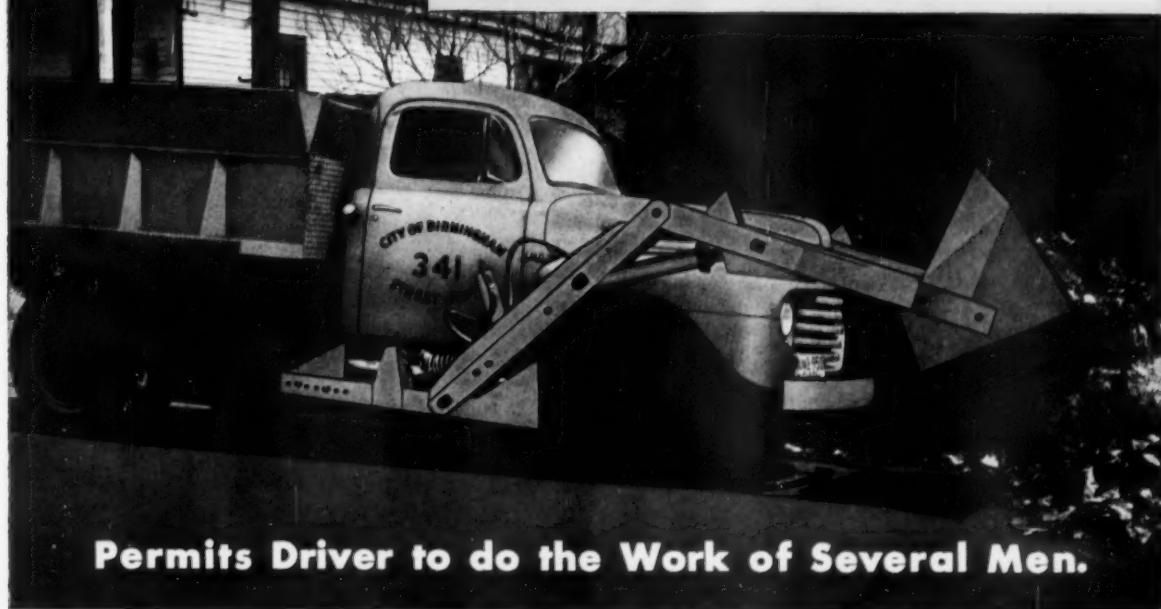
New **HOLMES OWEN LOADER**

REDUCES COST of maintenance on STREETS and PARKS

IMPORTANT municipalities such as the City of Birmingham, Ala.; Cincinnati, Ohio; Kansas City, Mo.; Philadelphia, Pa. and many others are today profitably using Holmes-Owen truck loaders. These key cities have put this equipment into operation because it substantially reduces the cost of many loading and cleaning up operations in the maintenance of streets, parks, airports, etc. This new loader provides a big saving in labor and equipment on such jobs as: picking up the leavings behind a street sweeper, removal of broken and bulky concrete, leaves, trash and other street deposits. It also makes an excellent unit for the removal of snow and handling of ashes, sand, and other stock pile materials.

The versatile, one-man operation of this equipment permits the truck driver to do his own light digging, grading, loading and cleaning-up without additional manpower or the use of more costly equipment. The loader is hydraulically operated, lifts $\frac{1}{2}$ yard per bucket; loads average truck in 4 minutes and can be installed on most $1\frac{1}{2}$ to $2\frac{1}{2}$ ton trucks. See your equipment dealer or write factory for details.

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Permits Driver to do the Work of Several Men.

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76. Monotube street lighting poles are offered in modern design for use with either incandescent or fluorescent luminaires on all street and highway lighting applications. For helpful information on these attractive and economical poles write to Union Metal Mfg. Co., Canton 5, Ohio, or check the coupon.

STREETS AND HIGHWAYS

Use Hot Patch Material On All Maintenance Jobs

297. With the Barber-Greene Mixall you can get hot patch material wherever and whenever you need it for all maintenance jobs. Send for new 8-page bulletin that gives full information on this small, highly portable unit that turns out all types of bituminous patch material in any quantity you need. Write Barber-Greene Co., Aurora, Ill., or use the coupon.

Bitumuls Paving Handbook Full of Useful Data

23. The latest edition of the Bitumuls Paving Handbook covers a wealth of practical data on paving methods and materials, road and airport paving specifications and construction details, complete tabular data on asphaltic binder applications and aggregate requirements, condensed Asphalt Institute specifications plus data on Laykold compounded asphalt for flooring, tennis courts, protective coatings and waterproofing. You can have a copy by checking the coupon. American Bitumuls Co., 200 Bush St., San Francisco 4, Calif.

Levels Sidewalks and Curbs Quickly and Easily

29. How the Mud-Jack Method for raising concrete curb, gutter, walks and streets solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities—a bulletin by Koehring Company, 3026 W. Concordia Ave., Milwaukee 16, Wis. Check the coupon.

Better Mowing and Brush Removal

30. Fast, versatile Wood rotary mowers are available in seven models to suit all types of municipal maintenance. Upkeep costs for roadside mowing, brush cutting, leaf mulching, park maintenance can all be reduced with efficient equipment. Get full details by checking the coupon. Wood Bros. Mfg. Co., Box 148B, Oregon, Ill.

Get Data Now On This Catch Basin Cleaner

34. Simple powerful pneumatic bucket is featured by Netco Catch Basin Cleaner. Folder 33A gives details and illustrates operation of complete self powered truck mounted unit. Netco Div., Clark-Wilcox Co., 118 Western Ave., Boston 34, Mass.

How "All-Season" Road Material Improves Patching Work

53. Komac, a long-lasting premix, may be applied in any weather, withstands winter wear and will not bleed when the weather gets hot. A 16-page booklet showing how you can do better patching work under all conditions, and presenting interesting case histories of road repair jobs may be obtained from Koppers Co., Tar Products Div., Pittsburgh 19, Pa. Just check the coupon.

Helpful Installation Manual For Drainage Structures

62. A 46-page manual, well worth careful study by designers and field engineers dealing with drainage structures, culverts, sewers or conduits, is offered by Armco Drainage &

Metal Products, Inc., Middletown, Ohio. Proper location of the structures, base preparation, assembly and backfill are some of the many items covered in detail. Use the handy coupon for free copy.

Faster Compaction On Street Repairs

108. Holes and trenches cut through pavement present difficult areas for compaction of backfill. Learn how to do the job quickly, easily and cheaply by using the self-contained, portable Barco Rammer. Full data on this low cost will be found in Bulletin 621. Write Barco Mfg. Co., 500 N. Hough St., Barrington, Ill., or check the coupon.

Black-Top Paver Offers Many Advantages

150. The flexible Admum Black Top Paver lays any asphalt mix, hot or cold, in widths from 6 ft. to 13 ft. Careful design lowers operating cost and cuts maintenance. Attachments spread stone, cinders or slag. Get full data on this machine by checking coupon. The Foote Co., 1934 State St., Nunda, N. Y.

End Manhole Rattle The Easy Way

184. It's easy to safeguard manholes and end annoying rattles by using Tapax, a wear-resistant, resilient manhole cushion available in convenient 100-ft. reels from Joseph G. Pollard Co., Inc., New Hyde Park, N. Y. Full details in Bulletin 14. Check the coupon.

8 Reasons Why You Should Check the Jaeger Loader

207. In a profusely illustrated 16-page catalog devoted to the applications and special design features of the Jaeger "Load-Plus" tractor-loader unit, eight good reasons listed to back up the claim that this machine out-produces any other loader of its size. These include load capacity, balance, reach, maneuverability, automatic power adjustment by torque converter, instant reversal, multiple speed and ease of control. Check them all by getting a copy of Catalog L100-3. Check the coupon today. Jaeger Machine Co., 400 Dublin Ave., Columbus 15, Ohio.

Another TYPICAL TOWN saving money with "Flexibles"

Franklin, Pennsylvania, is one of many typical American towns that use "Flexible" sewer-cleaning equipment. Shown is a Model 23R6 "Flexible" Power Bucket Machine—the pile of dirt representing "part of one day's work!" Wm. May, in charge of sewer maintenance, is operating the machine... while Mayor-Elect R. R. Bleakley, presently Chairman of the Streets and Sewer Committee, watches the operation. Mr. Bleakley, together with Mr. J. McKee Snow, City Engineer, was largely instrumental in choosing "Flexibles," after careful tests. The need for "Flexibles" was so great that two shifts are being used to clean the city's sewers. Here is a city that is so greatly pleased with the results they recommend "Flexible" equipment highly.



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How To Build Stabilized Heavy Traffic Pavements

233. A 16-page booklet published by Seaman Motors, Inc., Milwaukee, Wis., shows how low cost, local materials may be utilized in the construction of heavy duty pavements. Many illustrations and well-written text give full instructions on materials and construction methods for subgrades, subbases and base courses. A worth-while booklet for every highway engineer. Check coupon for copy.

Hot or Cold Patching Mixtures Prepared on the Job

204. By preparing your patching mixtures, hot or cold, right on the job, you can use them immediately with a minimum of handling. Get full data on the McConaughay Model HTD "Multi-Pug" Asphalt Mixer for fast, easy and economical preparation of patch materials. Write K. E. McConaughay, Lafayette, Ind. or use the coupon.

How the Mobil-Sweeper Can Improve Street Sweeping

205. Sweeping costs can be cut with the Mobil-Sweeper which features safe highway speeds up to 55 mph, carries 2 2/3 cu. yd. dirt hopper, sweeps swath up to 10' wide with full floating brooms. Hills and deep gutters are no obstacle. Write to The Conveyor Co., 3260 E. Slauson Ave., Los Angeles 58, Calif. or use coupon for complete details on this machine.

Cut the Cost of Road Rehabilitation

332. Be sure to investigate the Hetherington & Berner "Moto-Paver," the machine that does a complete mixing and laying job in one continuous operation. Specifications and complete information on both standard and heavy-duty models is provided in Bulletin MP-53. Get your copy from Hetherington & Berner, Inc., Indianapolis, Ind., or check the coupon.

"Quick-Set" Posts for Signs and Snow Fence

333. For quick, easy driving in any type of soil, be sure to check Buffalo Steel "Quick-

Set" sign posts, available in any length you need and ready-punched for fast installation of signs and snow fence. Get full data from Buffalo Steel Div., H. K. Porter Co., Inc., Tonawanda, N. Y. just check the coupon.

Speed Concrete Removal And Make Better Patches

202. Felker self-propelled concrete cutters saw to 6 1/2" depths to facilitate concrete removal and produce smooth, straight edges which resist spalling when patched. Full data on cutters and segmented type diamond abrasive wheels are available from Felker Mfg. Co., Torrance, Calif. Check the coupon today.

REFUSE COLLECTION AND DISPOSAL

Sanitary Landfill Operation and Methods

28. The location and area requirements for sanitary landfill, operation methods for trench type and area fills, equipment selection and costs are items discussed in an 8-page booklet issued by Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. Be sure you have this reference when considering the problem of garbage and refuse disposal. Check the handy coupon today.

New Roto-Pac Features Speed Refuse Collection

30. Features of the Roto-Pac refuse collection unit, which include automatic continuous loading and packing, with increased power to provide for larger loads in the same size body, are described in bulletins issued by City Tank Corp., 53-09 97th Pl., Corona, L. I., N. Y. Check the coupon now to learn how your collection problems can be eased.

Thinking of Sanitary Landfills? Get This Booklet Now

131. One of the most informative descriptions of the sanitary landfill method of garbage and refuse disposal is presented in Caterpillar's 16-page booklet "A Look to the Future with Sanitary Landfill." The booklet is designed to serve as a guide to proper site selection, the choice of the right equipment to do the job, and the actual operations of sanitary fill. Pictorial treatment shows how and when to start such a program, what to look for in a site, benefits received by the community, and other important considerations. Published by the Caterpillar Tractor Co., Peoria 8, Ill. Check the coupon for your copy.

Increasing the Efficiency of Bulk Rubbish Collection

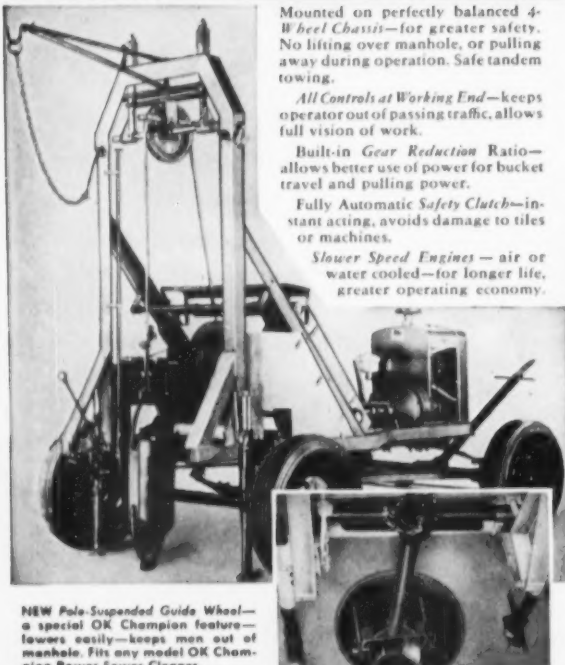
177. Strategically spotted bulk containers can be handled by one man operating a Dempster-Dumpster equipped truck. Get full details of this cost-saving system of rubbish collection, as used by many cities to increase efficiency and eliminate unsanitary conditions. Write Dempster Brothers, Inc., 952 Dempster Bldg., Knoxville 17, Tenn., or use the handy coupon.

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Uniform Salt and Cinder Spreading at All Speeds

93. Be sure to investigate the hydraulically operated ground drive offered by Baughman to give you the advantages of two drive speeds and uniform distribution of material regardless of truck speed, but without the need for power takeoff or transmission. Full data on this and many other features in Form A-380. Baughman Mfg. Co., Jerseyville, Ill.

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Mounted on perfectly balanced 4-Wheel Chassis—for greater safety. No lifting over manhole, or pulling away during operation. Safe tandem towing.

All Controls at Working End—keeps operator out of passing traffic, allows full vision of work.

Built-in Gear Reduction Ratio—allows better use of power for bucket travel and pulling power.

Fully Automatic Safety Clutch—instant acting, avoids damage to tiles or machines.

Slower Speed Engines—air or water cooled—for longer life, greater operating economy.

NEW Pole-Suspended Guide Wheel—a special OK Champion feature—lowers easily—keeps men out of manhole. Fits any model OK Champion Power Sewer Cleaner.

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NETCO CATCH
BASIN
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Easily mounted on any short wheel base truck with 8 ft. in back of the cab, the Netco can be operated continuously, averaging 20 to 30 catch basins a day. The Netco with its two powerful pneumatic buckets (orange peel or clamshell) is simple to operate, has a hoisting capacity up to 1500 lbs., and easily removes all debris through openings as small as 16 inches. Send for our six-page descriptive folder.



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Walk-Top is used extensively on all types of paving to provide a fast-
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Walk-Top, easily applied cold over the old pavement, by brush or
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A PROVEN PROCESS

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Hardin County Hospital, Kountze, Texas. Design: 150 population, 150 gal. per capita, 0.36 lb. B.O.D.

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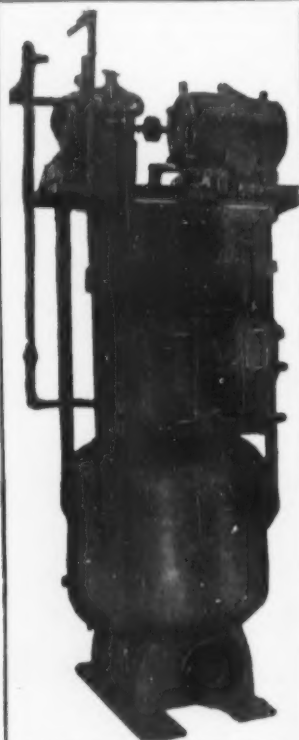
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Requires little installation space. Compact design utilizes every foot of space for settling of the sludge and permits large biological contact surface areas within a very small area.

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HAYS PROCESS COMPANY

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Compact ejector system having motor compressor assembly and all controls in one "packaged" unit.

WHY PUMP SEWAGE

When You Can EJECT It?

TO LIFT SEWAGE AND SLUDGE
AT TREATMENT PLANTS

USE BLACKBURN-SMITH PNEUMATIC SEWAGE EJECTORS

PREFERRED by most prominent consulting engineers as **LESS MESSY, MORE SANITARY** than centrifugal submerged type sewage ejectors or pumps.

ENDS CLEANING of screens and pumps.

LIFTS STRAIGHT UP, 150 feet capacity, once a minute, without fail.

30 to 500 GPM in both single and twin units against high discharge heads.

NO COMPLICATED PIPING—No place for collection of solids or sedimentation within the pots. **NO WORRY OVER OPERATION IN WATER** WHEN USING THE ENTIRELY PNEUMATIC SYSTEM.

Get Catalog \$50 today

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Snow Plows for Every Street and Highway Need

335. For details on the full line of Frink Sno-Plows, including the new taper-type reversible plow with hydraulic roll-over control, reversible trip-blade plows, Vee plows and all accessories, check the coupon today. Frink Sno-Plows, Inc., Clayton, N. Y.

Uniform Salt Spreading Saves Material

145. The wide, thin pattern provided by Tarco "Scotchman" spreaders avoids salt waste, saves time and labor. Get Folder BL for full details on this spreader and table of material application rates. Use coupon or write Tarrant Mfg. Co., Dept. PW, Saratoga Springs, N. Y.

CONSTRUCTION EQUIPMENT AND MATERIALS

1,001 Profitable Uses For Holmes-Owen Loader

39. The addition of a Holmes-Owen Loader to your dump truck converts it into a complete digging and loading unit that enables one man to load, haul and dump. Illustrated folder shows how this self-loading unit with hydraulic crowding action can be a real time and labor saver for the municipality or contractor. Check the handy coupon for full data. Ernest Holmes Co., Chattanooga, Tenn.

Easy Operation Featured for This Heavy-Duty Tractor

47. The Oliver OC-18, with 126 drawbar horsepower, is designed with nine "easy operating" features which contribute greater output on the job. Application photographs, diagrams and sketches as well as complete specifications are included in an attractive folder. For a copy write The Oliver Corp., 400 W. Madison St., Chicago 6, Ill. or use the coupon.

Concrete Saw Cuts Smooth, Straight Edges

85. When the sides of patches and trenches are sawed before breaking, a saving of 25% in removal costs is claimed. And the smooth, straight edges won't spall or crack after replacement material is poured. Investigate the exclusive features that give maximum economy to Clipper concrete saws. Full information from Clipper Mfg. Co., 2823 S. Warwick, Kansas City 8, Mo., or check the handy coupon.

Be Sure to Check Your Tractor Shovel Needs

94. A comprehensive 16-page catalog now available from Frank G. Hough Co., 761 Seventh St., Libertyville, Ill., shows how cities, counties, contractors and others use the Model HR four-wheel drive Payloader on earth and material handling jobs. Be sure to check the ways you could use this machine. Get Form No. 225 by checking the coupon.

Examining a Tractor Piece by Piece

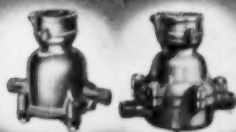
99. The 32-page catalog published by International Harvester Company should be studied by every tractor owner, for in each unit from engine to track of the TD-9 Diesel is considered separately. These piece by piece discussions are supplemented by notes on easy servicing, versatile applications and attachments for every need. Get your copy of form CR-313-A from International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill., or check the handy coupon.

Helpful Manual on Bodies and Hoists

101. The Heil Body and Hoist Manual is a handy 68-page booklet designed to furnish all information needed for selection of the correct body and hoist unit for your needs. Body and hoist features, payload distribution, hoist capacities and full operating and maintenance instruction are a few of the items covered in this comprehensive manual. Check coupon or write The Heil Co., Milwaukee, Wis.

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200. Aluminum gratings for walkways, bridge decking, and stair treads save weight, resist corrosion and are easily handled. Get complete design data, including safe load tables, standard panel widths and weights, from Irving Subway Grating Co., 50-53 27th St., Long Island City 1, N. Y. Just check the handy coupon.

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215. There are hundreds of jobs that can be done easier and cheaper by air placement of concrete; reservoir, tank and pool linings, concrete maintenance of all sorts are just a few of the applications. Get full details on two models of the high speed, easily operated "Bond actor" from Air Placement Equipment Co., 1009 West 24th St., Kansas City 8, Mo. Check the coupon.

Handbook of Castings For All Public Works Construction

220. Every type of construction casting needed by engineers and contractors in the public works field will be found in a 136-page catalog issued by Neenah Foundry Co., Neenah, Wis. Detailed illustrations and complete tables of dimensions will help the designer and materials buyer. Get your copy of this valuable catalog by checking the coupon today.

Trencher Fits Municipal Needs

313. A bulletin describing the Cleveland Model 95 trencher has been published by the Cleveland Trencher Co., Cleveland 17, Ohio. The Model 95, called "The standard machine for city and suburban work", is versatile, maneuverable and economical for use on water lines, service lines, road widening and all utilities trenching. Get this 8-page illustrated bulletin by checking the coupon.

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176. When installing link fence you want protection against rust and corrosion as well as vandalism. Investigate chain link fence made of "Konik" metal described in "Planned Protection" published by Continental Steel Corp., Kokomo, Ind.

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20. Specifications for vitrified clay underdrain blocks conforming to ASTM standards, suggestions for layout and construction of trickling filter floors, dimensions of standard blocks, channel covers, angles and other fittings are available from the Trickling Filter Floor Institute, c/o Editor, Public Works, 310 E. 45th St., New York 17, N. Y. Check the coupon and we will forward your request.

How Cities Clean Sewer Lines From Street in One Operation

25. In a helpful 28-page handbook of sewer cleaning methods and equipment the makers of OK Champion sewer cleaners give full details of power and hand operated models. Also included are data on expansion buckets that take dirt from sewer to street in one operation, root cutters and other accessories. Get your copy by checking coupon. Champion Corp., 4752 Sheffield Ave., Hammond, Ind.

Water Level Controls for Sewage and Water Plants

31. Dependable float-operated pump and motorized valve controls for single or multiple pump installations are described in bulletins issued by the Water Level Controls Div., Healy-Russ Co., 719 Hampden Ave., St. Paul 4, Minn. All units feature splash proof construction, mercury tube switches.

Complete Catalog for Engineers Shows Water and Sewage Plant Equipment

191. The complete line of Jeffrey equipment for treatment of water, sewage and industrial wastes is covered in 52-page Catalog 833. Detailed information is provided on bar screens, grinders, grit collectors, "Jigrit" washers, sludge collectors, feeders, conveyors this valuable booklet. Use coupon or write and other related units. Photos and drawings of installations plus capacity tables complete Jeffrey Mfg. Co., 947 N. 4th St., Columbus 16, Ohio.

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Design Data Offered On The Spiragester

42. The Spiragester, a unit which combines the Spiraflo Clarifier and a digestion compartment in a two-level arrangement to save space and reduce construction costs, is fully described in Bulletin 124 released by Lakeside Engineering Corp., 222 West Adams, Chicago, Ill. Design details, including capacities for 8' to 24' units are furnished together with typical plan and elevation. Check the coupon for this helpful bulletin.

A Handbook of Sewer Cleaning Methods and Materials

44. Complete, easy-to-follow directions for every type of sewer cleaning operations and the equipment needed for effective cleaning work is covered in a 40-page booklet issued by Flexible Sales Corp., 3786 Durango, Los Angeles 34, Calif. Full details are provided on power cleaning machines, the SeweRodeK, hand tools and all accessories. Water main and culvert cleaning methods are included. Check the coupon for your copy of this helpful handbook.

Helpful Design Data For Sewage Ejectors

81. The applications and advantages of pneumatic sewage ejectors are outlined in a new bulletin of the Blackburn Smith Mfg. Co., Inc., Hoboken, N. J. Included are piping diagrams for electrode and float switch controls plus dimensions and layouts for single and duplex systems. Get your copy by checking coupon.

Theory and Application Of the Flow Tube

84. Hydraulic formulae, head capacity curves and test data for this primary metering element are given in a technical bulletin, "Theory and Application of the Flow Tube," available from Foster Engineering Co., Union, N. J. Check the coupon for a copy.

Theory of Controlled Digestion With Floating Cover Tanks

88. In an excellent 40-page booklet, an authoritative discussion of digestion theory and practices, including design, operation and economics is presented by the Pacific Flush Tank Co., Chicago 13, Ill. Complete data are given on the use of floating covers, together with details on tank construction, piping and control chambers. Requests for this valuable booklet must be made on business letterhead.

Useful Data on Butterfly Valves

100. Complete descriptions and tables of dimensions on the full line of Rockwell Butterfly Valves is contained in several bulletins published by the company. Construction details and special control features are illustrated. Write W. S. Rockwell Co., Eliot Street, Fairfield, Conn.

What You Should Know About Design and Use of Concrete Sewers

122. Every engineer and contractor should have a copy of the 48-page book "Concrete Sewers" in his library. This valuable text, published by the Portland Cement Assn., 33 W. Grand Ave., Chicago 33, Ill., gives an authoritative discussion of hydraulics, sewer design, construction and maintenance. Generous use of helpful illustrations makes the book attractive and helpful to the reader. For your copy, just check the handy coupon.

Comminutors for Automatic Disposal of Coarse Sewage Solids

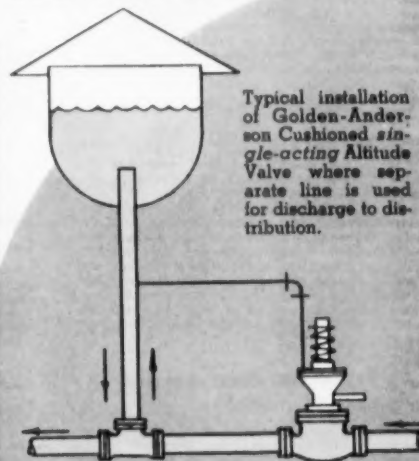
152. The problems connected with disposal of coarse sewage solids are eliminated by clean, odorless, automatic Comminutors. Full engineering data show the proper model for every size plant and furnish details of hydraulics and typical installations. Chicago Pump Co., 622 Diversey Pkwy., Chicago 14, Ill.

Factors in Selecting Chlorine Gas Feeders for Sewage Chlorination

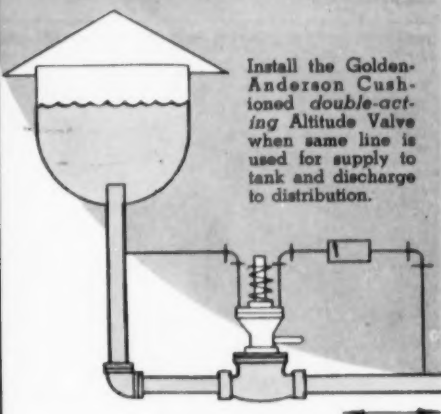
181. A technical data sheet, number 840-137, has been prepared as a guide in the application of chlorine for sewage treatment. The purposes of sewage chlorination, types of chlorination, points of application, control methods, types of feed and feeders and equipment location are discussed. Check the coupon or write to Builders-Providence, Inc., 345 Harris Ave., Providence, R. I.

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Helpful Data on Sluice Gates

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A Short Course In Pipe Jointing

169. The story of rubber couplings for clay and concrete pipelines is graphically presented in the booklet "Pipe Enterprise", published by Hamilton Kent Mfg. Co., Kent, Ohio. Detailed description of pipe jointing methods; photos showing jobs where Tylox gaskets met the need for easily assembled, permanently tight joints installed under all conditions; and a report on the development, manufacture and outstanding features of the compression type gasket make this booklet valuable to every engineer and contractor. Check the coupon for free copy.

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232. Many advantages of Roots-Connersville positive displacement rotary blowers are described in Bulletin 22-23-B-13, which also provides characteristic curves for operation with constant speed, multi-speed and variable speed motors and details of several types of blowers. Get this helpful bulletin by checking the coupon. Roots-Connersville Blower Corp., Connersville, Ind.

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Reference Book on Lubricated Plug Valves

273. Lubricated plug valves, including stick-proof lever sealed valves for easy operation and positive mechanical seal are fully described in reference books issued by Homestead Valve Mfg. Co., Box 550, Corapolis, Pa. Check the coupon for your copy.

Submersible Sewage Ejector Simplifies Installation

275. The Weil submersible non-clog sewage ejector is a compact unit with a completely sealed motor, available in several sizes with capacities up to 300 gpm. For details on unit selection, installation methods, construction features and controls get Bulletin SE-860A from Weil Pump Co., 1530 N. Fremont St., Chicago 22, Ill. Check the coupon.

How to Dispose of Sewage and Industrial Sludges

281. Get full information on the C. E. Raymond System of combined incineration and sludge drying providing high temperature deodorizing for nuisance-free sludge disposal. Flexible layouts fit large and small communities. Use handy coupon or write Combustion Engineering Inc., Flash Dryer Div., 200 Madison Ave., New York 16, N. Y.

Get the Facts on The Contact Aeration Process

303. Full engineering details on the submerged contact aeration process of sewage treatment, including diagrams of plant units, area requirements, operating costs and other details are available in a bulletin of the Hays Process Co., Box 768, Waco, Texas. Check the coupon to get the facts.

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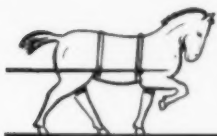
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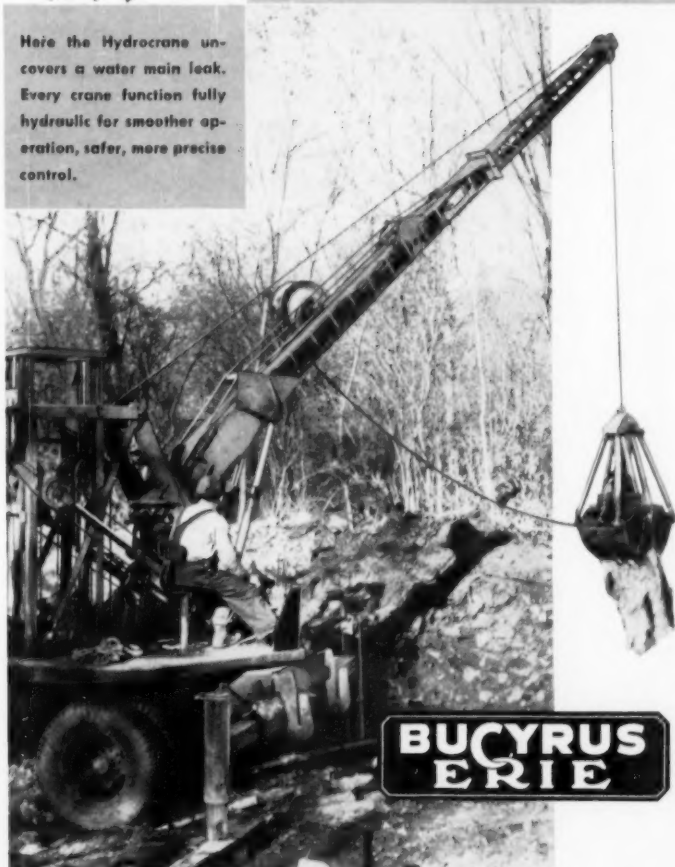


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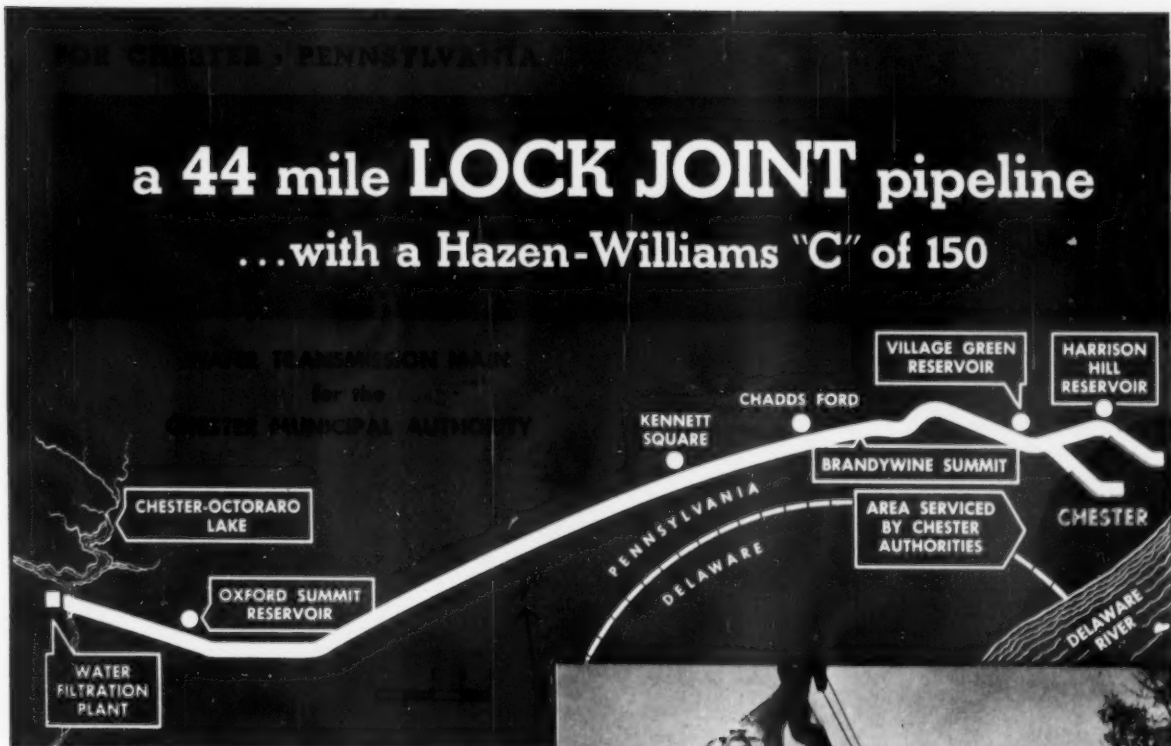
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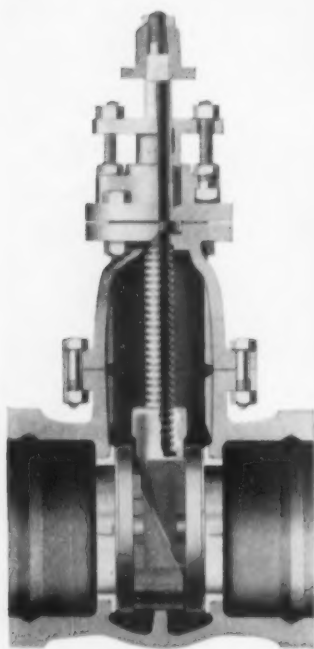
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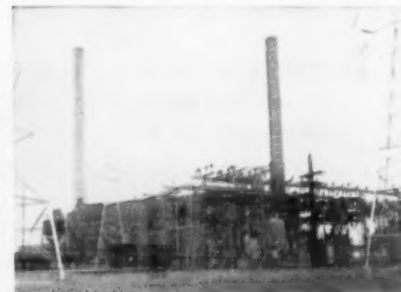
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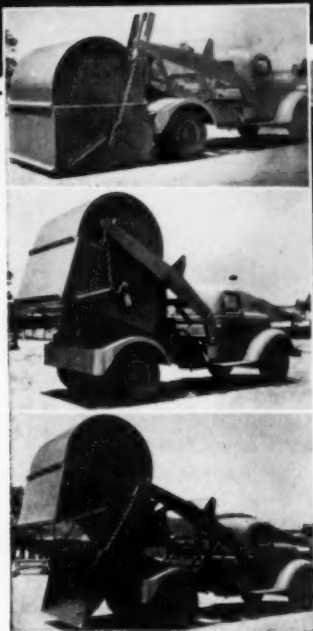
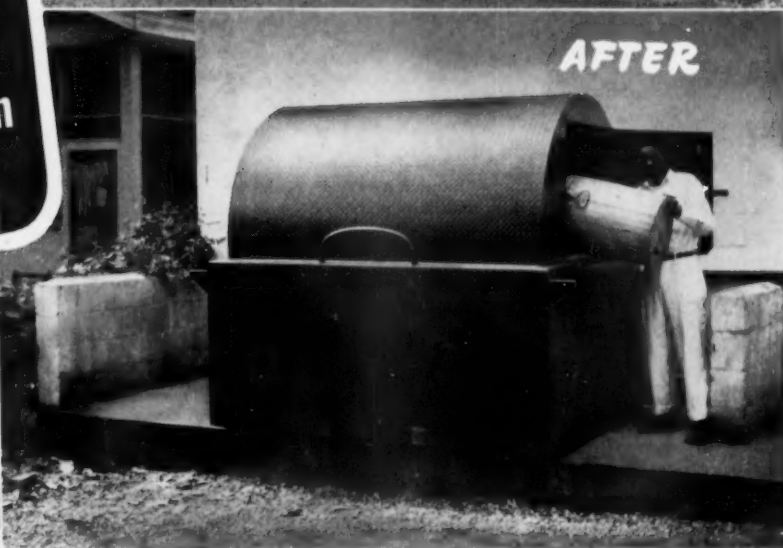
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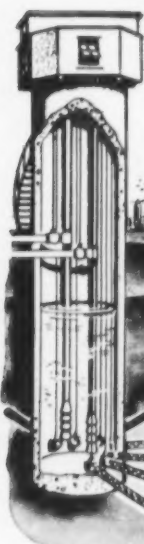
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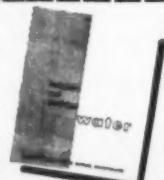
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Saves TIME
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The Frink V-Type Sno-Plows give cleaner and safer plowing because there is no side thrust. The unique feature that prevents this is that the heel adjusting chains are so arranged that the weight of the snow, as it is carried up and out, is transferred through these chains to the lifting device assembly and directly to the front wheels.

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For further details on this Sno-Plow write for catalog to nearest address, Box P.W. 542

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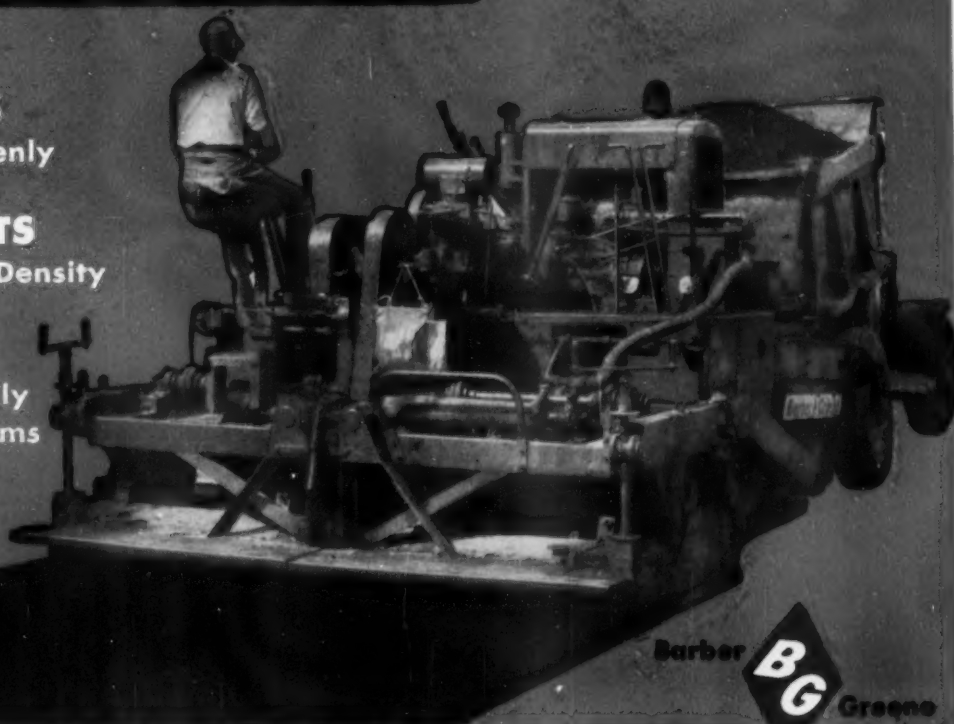
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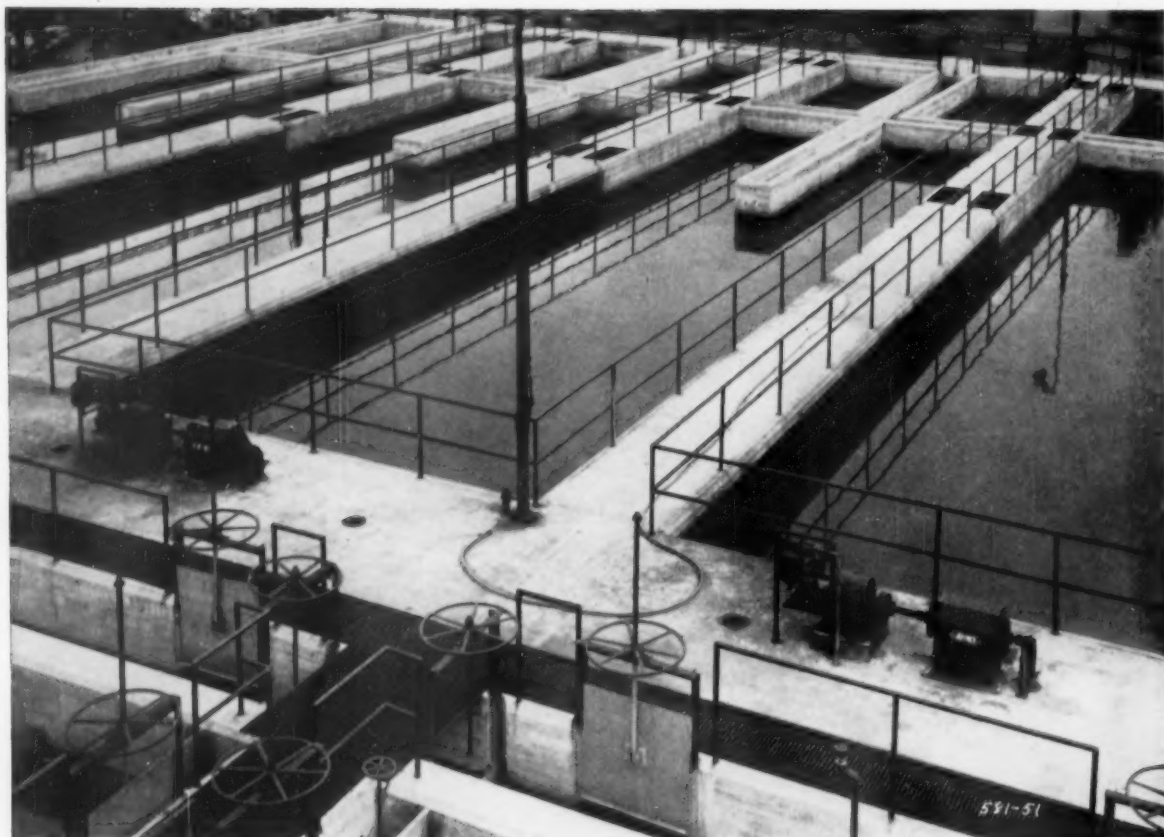
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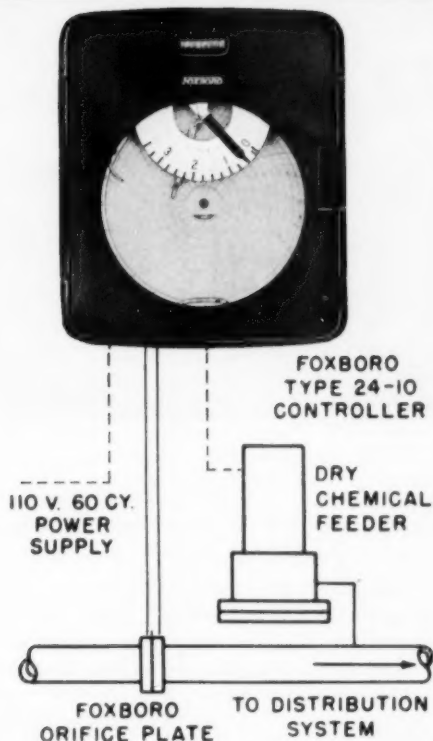
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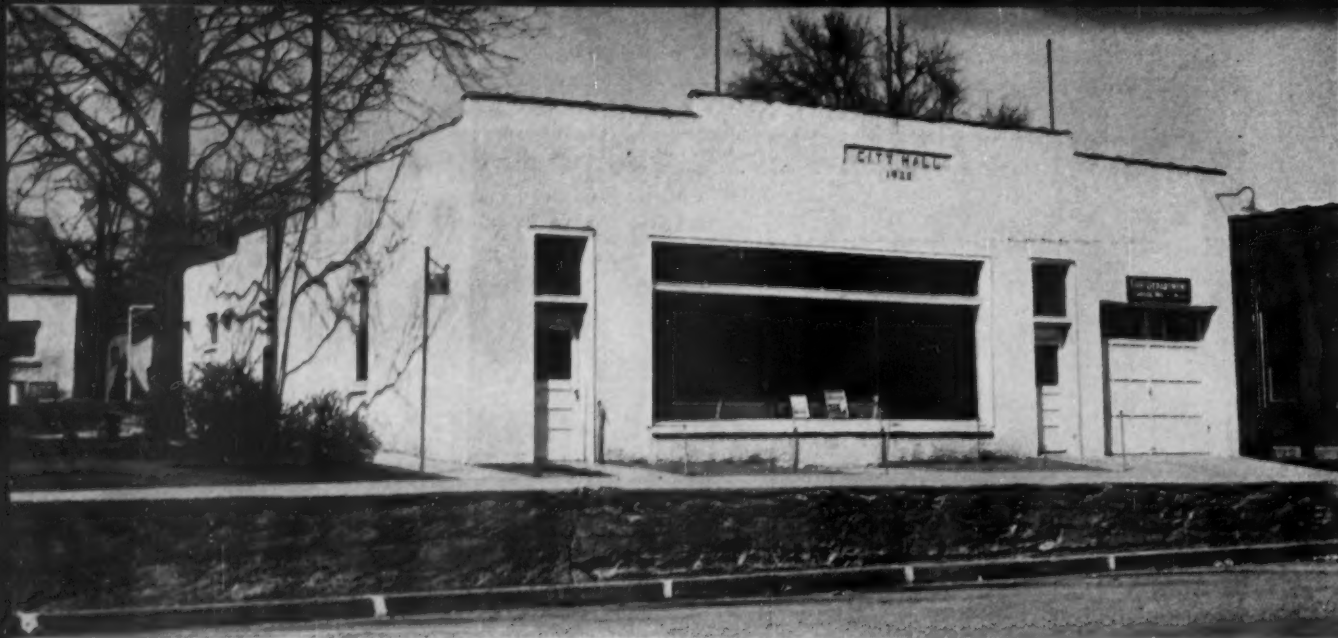
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**CAT POWER
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Making Modern Highways in PENNSYLVANIA



● HEAVY EQUIPMENT being used to widen and prepare shoulders for super-elevation and widening on outside of curve.



● TRENCH excavated for widening existing road. Aggregate for foundation is shown being compacted by a trench roller.

E. L. Schmidt,

Secretary of Highways

Harrisburg, Pennsylvania

END of World War II found Pennsylvania, in common with many states, confronted by chaotic highway conditions, due largely to enforced neglect. Many thousands of miles of pavement, particularly concrete, were more than twenty years old. They were too light and too narrow for modern traffic and maintenance costs were excessive. Pennsylvania Department of Highway engineers conducted a physical inventory of the 41,000-mile system that indicated a replacement and rehabilitation need in excess of one billion dollars. Later, in 1950, the Highway Planning Commission, in a report to the Governor and the Legislature, estimated the needs at \$1,725,000,000.

Meanwhile, rehabilitation had been started with an initial program of about 200 miles per year. Selected projects, having good grade and alignment, were modernized by widening and resurfacing. As experience was gained and popular acceptance secured, rehabilitation has been stepped up to current annual programs of about 900 miles at an expenditure of between \$25,000,000 and \$30,000,000.

Old beaten up macadam pavements are generally overlaid with a new course of broken stone base and surfaced with bituminous concrete at least 2½ inches thick. Concrete roads are given careful study. If the broken sections do not exceed 20% of the surface involved they are repaired. Sound concrete is sub-sealed and repaired areas are covered with hot bituminous concrete to a minimum depth of 2½ inches. Otherwise they are overlaid with a broken stone base and surfaced with bituminous concrete. Simultaneously, there is carried forward an extensive program of reconstruction of highways that cannot be salvaged economically. These programs include elimination of severe vertical and horizontal curves and construction of extra climbing lanes on long ascending grades for trucks and buses.

The entire program has been well received by motorists since much of the work can be done without major traffic interference and smooth surfaces are provided.

During the years in which Pennsylvania has been engaged in large scale rehabilitation, vast experience has been gained in methods, costs, difficulties encountered and corrective measures necessary to convert a worn-out roadway into modern traffic lanes capable of handling,

speedily and safely, the rapidly increasing traffic. A representative cross-section of examples follow with detailed cost data on several typical projects.

An outstanding example of rehabilitation and salvaging of existing pavement is located in the southwest corner of Clearfield County, on Traffic Route 36, Legislative Route 221, which is a direct route between Mahaffey and Altoona. This section is 13.58 miles long. The improvement consists of widening the existing pavement with 4 to 6 ft. of 12-in. crushed aggregate (Type AP) base course and surfacing of the new base and existing pavement with 2½ ins. of ID-2 bituminous surface course 22 ft. in width. The widening also includes the extension of 11 existing reinforced concrete repairs of two existing structures, structures and the alterations and Approximately 4449 feet of new base and bituminous surface course was used to improve grades and sight distance on vertical curves. A base course provided for replacing the broken sections of existing concrete base course. In some instances, where the

**PUBLIC
WORKS**

Magazine

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FEBRUARY 1954



● TYPICAL section of old bituminous road before improvement for more traffic.

concrete base course failure was extensive in length, a crushed aggregate base overlay was provided. Provision was also made to build up the horizontal curves to standard superelevation. The drainage system was improved by adding additional tile drain, ditches and curb and gutter through the boroughs.

The completion of this project will result in the extension of the usefulness of this highway for from 15 to 20 years. Work was started on July 7, 1952, with 130 working days allowed to complete the work, and completed in September 1953.

Legislative Route 7, Section 13, Traffic Route 6, in Wayne and Pike Counties, 9.64 miles in length, located east of Hawley to Shohola Falls, is another exceptional example of rehabilitation. The old road, which was constructed 1925 to 1927, consisted of macadam with a stone base course, 18 to 20 feet in width. The roadway crown became badly distorted and edges of the pavement ragged, narrowing the riding surface considerably. The super-elevation of curves was inadequate for present-day traffic.

Inasmuch as the base and surface courses were not disintegrated to a point warranting new construction it was deemed advisable to rehabilitate this route by resurfacing, reconstruction and widening. An overlay of crushed aggregate base course was placed over the existing pavement, varying in depth from 4 inches to 8 inches according to the degree of deterioration of the old pavement. Some portions required only resurfacing. Variable widening, consisting of 10 inches of crushed aggregate base course, to make a

uniform width of 22 feet, was designed to utilize the existing pavement and eliminate some irregular alignment of the old road. Super-elevation of curves was provided by building up with crushed aggregate material to meet present-day standards. Bridges and other drainage structures were extended and repaired where necessary. Shoulders were reconstructed to have a width of 8 feet in cut sections and 10 feet in fill sections.

The entire project was surfaced or resurfaced with a bituminous surface course, ID-2, 2½ inches in depth, 22 feet in width, except in sections where there was no crushed aggregate material placed, then the depth of the bituminous surface course was increased to 3 inches.

In the northwest corner of Beaver County, there is a section of 18-ft. concrete road constructed in 1921. Pennsylvania Traffic Route No. 51 traverses this road and connects with Ohio Traffic Route No. 14. These two traffic routes developed into an ideal truck route into the Ohio River Valley area serving Beaver Valley and Pittsburgh, and directly linking with Traffic Route No. 30 East, and the Pennsylvania Turnpike. Traffic counts revealed that approximately 7,000 vehicles per day were using this road and about 40% of this traffic was heavy truck traffic.

During the winter and spring of 1946-47, considerable break-up of the concrete occurred due to insufficient depth of pavement and unstable subgrade. Extensive concrete patching was performed but break-ups were so numerous and frequent that this method of repair

was abandoned. A 6-in. crushed aggregate overlay and 2½-in. bituminous concrete surface was placed in 1947 on a 4-mile section between Darlington Borough and the Village of Black Hawk. A 4-in. leveling course of crushed aggregate was placed over distorted broken concrete sections and thoroughly screened and rolled before placing a 6-in. overlay. This has proven very satisfactory.

Resurfacing Old Brick

Another recent rehabilitation was on a section of Legislative Route 26100, 4.88 miles in length, in North Union and Dunbar Townships, Fayette County. An old brick pavement 16 ft. wide, on a cinder base, became badly distorted due to heavy coal hauling and was inadequate for present-day traffic.

The work consisted of widening 4 ft. 4 ins. right or left to a total pavement width of 20 ft. with 5-ft. shoulders, giving total width of 30 ft. The widening consisted of 10-in. to 12-in. crushed aggregate base; and a large portion of the old brick surface was overlaid with a 6-in. crushed aggregate base course to afford sufficient stability for the 2½-in. bituminous concrete surface course. Included in the contract was the construction of a new I-beam bridge with a 3-in. concrete filled steel beam deck and ornamental iron railings. It was necessary to adjust the track facilities of the Pennsylvania Railroad Company immediately adjacent to the bridge structure.

Route 342A is located in Hamilton and Reading Townships, Adams County, between the Lincoln Highway at Cross-Keys and the Village of Hampton, an overall length of 5.05 miles. The work consisted of widening the major portion of the existing macadam pavement and overlaying the entire surface with a 6-in. crushed stone base course and placing a bituminous surface course of ID-2, having a compressed thickness of 2¼ inches.

It is a good example of how an old macadam pavement, that has been serving the public many years, can be salvaged with the least expense to the Department. In order to utilize the old pavement as a bottom course, it was necessary to widen on one or both sides approximately 4 ft. and to build up the outside edges with a leveling course to conform to the proposed finished surface 22 feet wide, having a crown of 2 ins. at the centerline.

Another project is located in

Dauphin and Lebanon Counties, from Hockersville east toward Fontana. The overall length is 7.93 miles. The construction consists of widening the existing macadam pavement to 22 ft. and 40 ft. with the necessary build-ups on the super-elevated curves; and placing an overlay of crushed stone base course over which was laid a 2¼-in. bituminous surface course of ID-2 material. The contractor set up his own portable plant near Cornwall, and was able to produce a high daily tonnage of ID-2 bituminous material. More than 111,500 square yards of bituminous material were laid from material from this plant.

Another outstanding example is located in Lebanon County. The overall length of the project is 9.2 miles. The construction consists of widening the existing concrete pavement 6 feet with plain concrete base or crushed stone base build-ups. The horizontal curves and

Federal Aid funds. The construction consisted of widening the present 16-ft. pavement with crushed aggregate to a width of 20 ft.; overlaying the existing pavement with crushed aggregate base and resurfacing with 2½ ins. of asphaltic concrete, Specification ID-2. The original roadway was constructed between 1905 and 1907 with a Telford base approximately 6 ins. in depth and surfaced with cinders. About the time of World War I the cinders were removed and a bituminous surface was placed on the old base with no effort made to remove the excessive crown, approximating ½ to 1 inch per foot, which in many instances was nearer the quarter point than the center of the highway.

Along this section were a number of bridges, all of which were inadequate in roadway width and some of them in waterway opening. Abutments were extended and new

a 5-inch CAB overlay with a 2¼-inch ID surface over an existing 6 x 8 x 6-in. concrete pavement, which previously had been surfaced with 2 ins. of HE bituminous material. The section is 1.03 miles in length and carries a daily traffic of 3500 vehicles.

Detail cost data

Cleaning and grubbing Class #1 excavation and shoulders \$6866.91; pipe and underdrains \$1219.75; 5" overlay, 14472 square yards: Labor and equipment \$8778.71; materials: #4 Stone, 2999.1 tons @ \$1.50, \$4498.65; #1 Stone, 957.945 tons @ \$1.50, \$1436.92, for a total of \$14,714.28. Labor & equipment cost per square yard \$0.607; material cost per square yard \$0.410; average cost per square yard \$1.017.

Bituminous material, 2¼-in. ID-2, 14472 square yards: Labor and equipment, \$2961.92; 1946 tons ID-2 @ \$7.90, \$15,373.41 for a total of



● FINISHED JOB of new top in Northumberland County.



● NEW BITUMINOUS concrete surface in Clarion County.

surfaces were renewed with 3-in. bituminous surface course ID-2. The contractor set up a portable plant unit near Lickdale siding, which had incorporated all the automatic features of a continuous volumetric plant, and was geared to produce up to 1000 tons of material daily. More than 23,000 tons of material were produced at this plant and hauled to the project for spreading and rolling.

This project is representative of the salvaging of an old, existing 18-ft. concrete pavement that was subject to heavy traffic loads.

LR 279-2R, TR 69, Warren County, approximately five miles in length, was financed with secondary

super-structures to conform with the present-day standards were provided. Traffic hazards and bottlenecks have thus been eliminated. In addition, proper superelevation has been built into each of the curves and a modern highway is now in use which meets all the requirements of the traffic using it. Great savings were affected in this salvage and rehabilitation project.

Since costs are always of prime interest, there are appended two projects with detailed cost data. One is on Legislative Route 161, Traffic Route 122, in Northumberland County between Sunbury and Shamokin which was completed last year. This project consisted of

\$18,335.32. Labor and equipment cost per square yard \$0.205; material cost per square yard \$1.062; average cost per square yard \$1.267. Grand total cost \$41,136.26.

The other project on which detailed costs are given is on Legislative Route 195, Traffic Route 104, in Snyder County. The project was 4.33 miles in length, between Mt. Pleasant Mills and the Dauphin County line. This route carries a daily traffic count of 730 vehicles.

The work consisted of placing a 2-in. CP-2 surface over an old bituminous surface on an 8-in. crushed stone base, 18 ft. in width and involved 45,800 square yards

(Continued on page 68)

Sewer Tunnel

speeded

IN common with most other cities, Cleveland, O., had—and still has—storm sewer problems. The case history of the solution to the problem in one part of the city, where unusually efficient methods of construction were used, can be of value to other communities faced with this same need.

To start at the working end of the project, which finally involved 9,448 ft. of sewer tunnel ranging from 6 ft. to 11 ft. in diameter, is to describe the method used in tunnelling. This particular line, called the Lee Road relief sewer, drains some 898 acres lying east of that street. Run-off from the area is estimated at 987 cfs, while the capacity of the completed sewer is 1,000 cfs. More data on design will be given later.

The depth of the sewer below street level ranges from 15 to 40 ft. and tunnelling was deemed necessary in order not to disrupt traffic or interfere with existing subsurface structures. Subsurface formations are mainly solid blue clay, with some sand pockets and water. The problem in construction was to find the most effective and economical method of boring the tunnel.

Lombardo Bros. Construction Co., the contractors, decided to investigate the possibility of using a coal mining conveyor system to bring the excavated material back from the face of the tunnel to the shafts for removal. It was believed that such a conveying system could do the work faster than it could be done by such a standard method as a narrow gauge track and cars, whether these were pulled by men, a cable or an electric locomotive. Mining engineers of the Jeffrey Mfg. Co., Columbus, O., were called in to recommend a system that would move at least 50 cu. yds. of muck

from the heading to the shaft in an 8-hour shift. Maximum haul distance was indicated as 600 ft., since shafts were to be located at 1200-ft. intervals.

The Jeffrey engineers recommended a pair of heavy-duty drag chain conveyors, termed by the manufacturers No. 61 AMH. This conveyor is manufactured in standard 6-ft. sections, which can be added to as needed.

Driven by an electric motor through a speed reducer at a rate of 90 ft. per minute, the conveyor has a capacity of 1 to 1½ tons per minute. Though it was designed originally for an operating length of 300 ft., it has been operated in this tunnel work in lengths up to 600 ft. with satisfaction and efficiency.

Operation is as follows: The shafts—about 18 ft. in diameter—are sunk at the points indicated by the city on the plans. The tunnel is then driven in both directions from the base of the shaft, conveyor sections being added as the heading moves forward. The material—the muck—returned to the shaft by the con-

veyors, is removed by a crane and clamshell and loaded into trucks for disposal. Water collecting in sumps in the tunnel is pumped to the street level and discharged into existing storm drains.

In tunnelling, the top half of the section is taken out first; the tunnel is then ribbed and lagged, as shown in the illustration, before the bottom section is removed. The head of the conveyor is spotted at the level of the base of the upper half-cut to remove the muck from this operation; and then is shored up to remove the lower-half material.

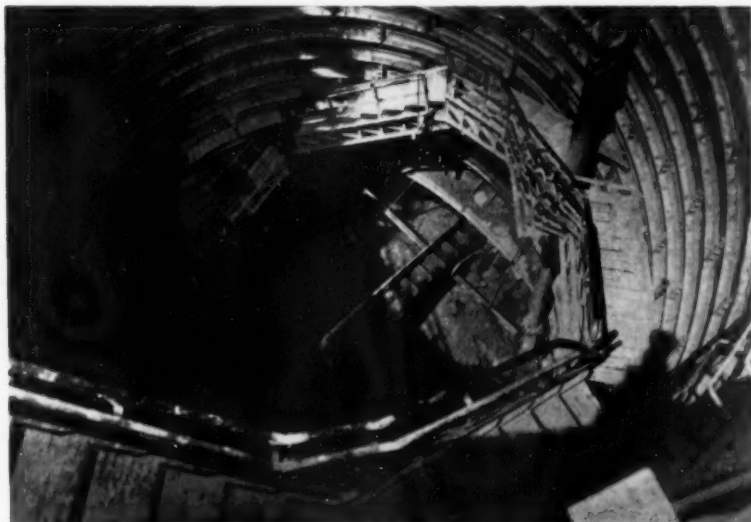
After the tunnel section has been removed, the concrete invert is poured. Later, the tunnel is lined with concrete, which is poured through 8-inch cased openings driven down from the street level. Steel forms are used. The lower half of the sewer will be faced with brick.

Though there was initially a noticeable lack of enthusiasm on the part of many for the idea of using coal mining equipment for this kind of tunnelling, the skeptics have generally changed their minds and now admit that the conveyor method is faster and more economical than conventional methods, in this case at least. Progress has been consistently good and delays have been at a minimum.



● CLAY spaders are used to cut the tunnel, shown in half-section.

by using Mining Equipment



● **LOOKING** down one of the shafts. This picture shows the method of timbering and bracing the shaft, the stairway, and the end of the belt conveyor.

One of the biggest problems involved the development of proper lubrication for the conveyor elements. Conditions are much more severe than in coal mining work and excessive wear developed on the pan decks and the return strand guides from the sand particles in the material being conveyed. As a solution, grease cups were installed every 100 ft. to lubricate the return guides and oil drips were hung over the pan at similar intervals to drip oil onto the deck. These measures cut down materially on the wear, but did not entirely eliminate it. However, the efficiency of the installation has been such that the contractor feels that such replacement costs as are necessary are well justified economically.

This Jeffrey 61 AMH conveyor has pans of 3/16-inch steel, with block link chains of high quality malleable iron and side bars and pins of .40 carbon steel provided with special drop forged steel flights, forged as a part of a chain every 8 links. The pin and cotter assembly makes additions of chain sections for new intermediate pan sections easy. Brass takeup screws on each side of the tail end section allow

for quick adjustment of tension in the chain. Pan sections are held together with special bolts that are easily operated and a steel lip is welded to the bed plate to make a tight seal at the joint, preventing leakage of fines and much water.

First steps in the construction of this relief sewer dates back to 1950, when residents complained of water in the cellars. A study then de-

veloped the fact that sewers serving a portion of the area were overloaded. The plan worked out provided for the Lee Road relief sewer which not only took a portion of the load from some of the existing storm drain lines, thereby extending their usefulness indefinitely, but also provided drainage for the entire 898 acres in the area lying east of Lee Road.

The design by E. C. Richardson, engineer of sewer design for the city of Cleveland, provided for a runoff from the area of 1.10 cfs per acre, with a total runoff for the 898 acres of 987 cfs. The sewer starts at the upper end as a 66-inch line, with a capacity of 146 cfs on a grade of 0.0025, and increases to a diameter of 11 ft. The outlet is into Mill Creek at a point in Kerruish Park. This outlet is rectangular, a concrete box with dimensions of 10 ft. by 7.5 ft. The concentration time as computed by Mr. Richardson, is 54 minutes plus 8 minutes inlet time. The sewer is designed to care for a 5-year rainfall and runoff.

The contract to Lombardo Bros. Construction Co. amounted to \$1,464,793. Work began in May, 1952. Clarence Lillig has acted as construction engineer for the city. The work is expected to be completed in 1954. An additional contract is planned, covering a 3,000-ft. extension of this line north.



● **FINISHED** section of tunnel; the conveyor is still at work.

WATER ANALYSES AID....in Selection of PLUMBING MATERIALS

VITO F. NOLE,

Corrosion Engineer

Chase Brass & Copper Co., Incorporated

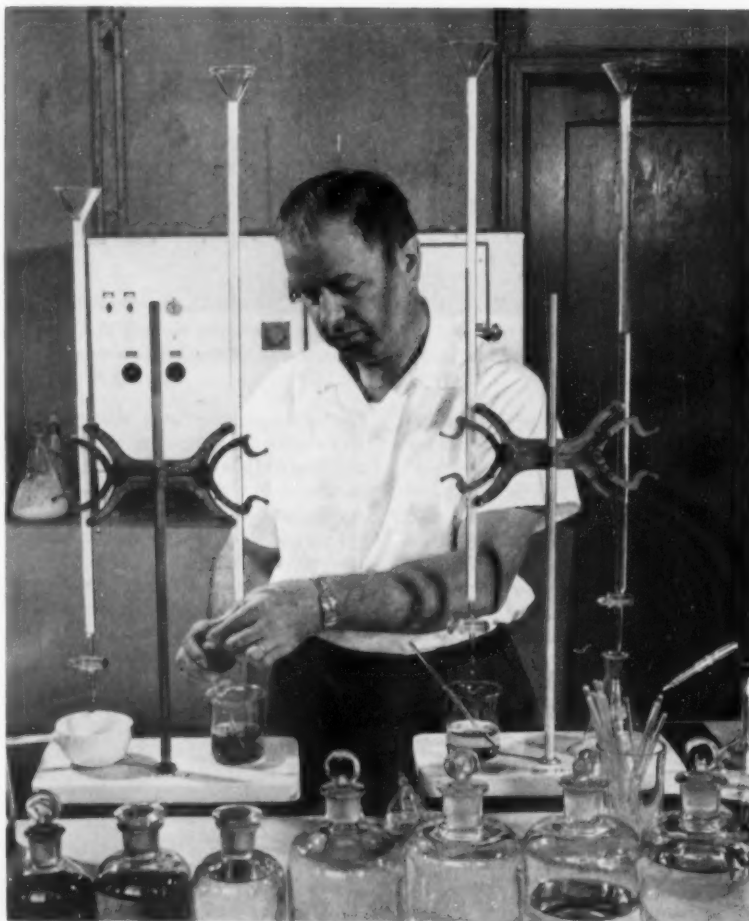
Subsidiary of Kennecott Copper
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WATER, one of the prime essentials for all forms of life, has the power of dissolving many substances. While chemically a rather simple combination of the elements hydrogen and oxygen, its exposure in natural environments leads to wide variations in its characteristics, including its dissolving power or corrosiveness. This latter factor is of particular importance in the distribution of water for human consumption, for one obviously desires to select pipe for plumbing lines that will withstand successfully the corrosive attack of the water. Pipe materials vary in their inherent resistance to water corrosion so that the problem of selection is one of matching pipe and water characteristics. Knowledge of particular waters is gained from analyses made to ascertain the nature and amounts of mineral and gaseous substances dissolved in the waters.

Surface Waters

All of our water supplies originate in moisture precipitated from the atmosphere in the form of rain, snow, sleet or hail. The moisture which falls contains particles of dust, dirt and soot as well as small quantities of gases absorbed from the atmosphere.

When water falls upon the earth, it comes in contact with the various minerals of which the earth's crust is composed. Some of these minerals



● LABORATORY examination of the water can give valuable advance information.

are relatively insoluble and hence adjacent surface waters of brooks, ponds, rivers and lakes are relatively low in mineral content. On the other hand, if the rocks of a certain area are quite soluble such as limestone, the waters in such a region will contain considerably more mineral matter. In addition to dissolved min-

erals, surface waters may contain appreciable quantities of suspended insoluble matter such as silt and may also contain organic matter.

Sedimentation, coagulation with certain chemicals and filtration may be used to remove suspended silt or organic matter from these waters. Such treatments do not reduce the

soluble mineral content of a water. Hence, a filtered water contains just as much dissolved mineral matter as it did before filtration.

Ground Waters

Approximately one-third of the rain which reaches the earth seeps into the ground. Since the movement of ground water is relatively slow, it is in longer contact with mineral matter than is the case with surface waters. Due to longer contact, ground waters, such as obtained from wells, springs and underground rivers, usually contain much more dissolved mineral matter than surface waters of the same area. It is evident, therefore, that the quantity and relationship of the various constituents of a water vary considerably from place to place and are intimately related to the geological features of the region, that is, the kind of rocks present, the type of drainage and certain other factors. In view of the fact that water supplies do vary in character and therefore in their corrosive action on copper alloys and other metals which may be required to handle them, it is suggested that an analysis of the water to be handled be made so as to determine its corrosive nature. On the basis of such an analysis, suggestions are made as to the proper materials to use for the type of water in question.

As will be discussed, water may be classified as (1) protective to plumbing materials; (2) moderately corrosive; (3) corrosive because of high salinity; and (4) corrosive because of high free carbon dioxide content and/or low carbonate hardness.

Chase Water Testing Service

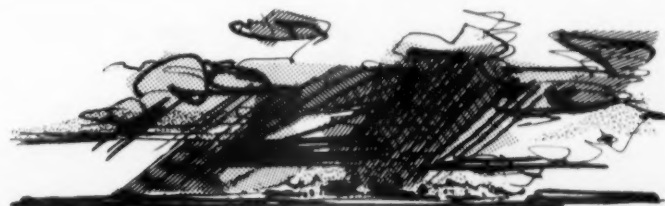
As indicated above, the effect of waters on plumbing may be predicted by chemical analysis of a suitable sample. These determinations include free carbon dioxide content, total hardness, alkalinity, salinity in the form of chlorides and sulphates and the hydrogen ion concentration.

For many years Chase has maintained a service of analyzing water samples to determine the characteristics of the water with respect to its effect on plumbing materials. The service includes the use of a chemically clean bottle and a shipping container for water and detailed instructions for obtaining the sample and shipping. It should be noted that this analysis in no way reflects upon the potability of the water and

refers only to the mineralogical constituents of the water. Before any supply is used for drinking water, it should be analyzed biologically to determine the nature of its organic matter. This may be done by a local laboratory with proper facilities.

More than three thousand miner-

attributed to the bicarbonates of calcium and magnesium. These are precipitated by boiling. Non-carbonate hardness, sulfate hardness and permanent hardness are synonymous terms for that hardness due to the sulfates, chlorides, and nitrates of calcium and magnesium



alogical analyses have been made, reported and indexed according to geographical areas. The service has been particularly useful to plumbing contractors and their customers in making the important decision of selection of plumbing materials for homes, industry and commercial buildings throughout the United States.

A brief discussion on water analysis terms and water classifications follows:

Free Carbon Dioxide (CO₂). Carbon dioxide is a normal constituent of the air, resulting from the respiration of animals and the decay or combustion of organic matter. Since it is very soluble in water, varying amounts of it are found in most natural waters. Small concentrations may be present in surface water and large concentrations in ground or well waters.

Free carbon dioxide may be considered as a gas dissolved in water. In solution it has acidic properties and is called carbonic acid. Although this acid is unstable and may be eliminated by heating or aerating the water and is a weak acid as compared with hydrochloric, nitric or sulphuric acids, it is nevertheless corrosive to metals. It would be expected to cause some corrosion of nonferrous metals and serious corrosion of ferrous metals.

Total Hardness as CaCO₃. The hardness of a water is that quality which renders it difficult to obtain a lather with soap. The constituents responsible for hardness are the calcium and magnesium salts. Carbonate hardness, bicarbonate hardness and temporary hardness are synonymous terms for that hardness

which can not be removed by boiling. Hardness determinations are always reported in terms of calcium carbonate (CaCO₃) and are given in three different ways; namely, carbonate hardness, non-carbonate hardness and total hardness. The total hardness is the sum of non-carbonate hardness plus the carbonate hardness. The constituents making up non-carbonate hardness are corrosive while those making up carbonate hardness are relatively noncorrosive. High concentration of carbonate hardness may cause precipitation of lime on heating.

Methyl Orange Alkalinity as CaCO₃. The alkalinity of natural waters is due primarily to the presence of the carbonates of potassium, sodium, calcium and magnesium. Ordinarily the alkalinity of water is due to calcium and magnesium bicarbonate so that alkalinity usually equals the carbonate hardness. Potassium and sodium bicarbonates contribute to alkalinity without influencing the hardness. When these bicarbonates are present, the alkalinity will exceed the hardness.

Alkalinity determinations in a water analysis are made by titration with a standard acid solution using two different indicators, namely, methyl orange and phenolphthalein. The results of titration with methyl orange indicator are expressed as methyl orange alkalinity. When this value is less than or equal to the total hardness, all the hardness is present as carbonate hardness and the excess is sodium alkalinity. Such waters can be expected to be practically non-corrosive.

Phenolphthalein Alkalinity as
(Please turn to page 119)

CUTTING THE COST OF CUTTING WEEDS



● CITY cuts weeds on vacant lots and charges the cost to the property owner.

C. E. WRIGHT

FAST growing weeds on vacant lots are a problem for many municipalities, being both unsightly and a hiding place for mosquitoes. A city ordinance of Jacksonville, Fla., requires that property owners cut their own weeds, but if they don't do it the sanitation division of the city health department steps in and does the job for them, billing them for the cost. If the costs run too high, there are squawks from the taxpayers.

So H. D. Peters, director of Jacksonville's sanitation division, sought for a method more economical than the hand labor method that had been used. Recently the department purchased a Ferguson 30-hp. tractor and a Lawrence brush cutter and rotary mower, the latter a product of the Harris Foundry & Machine Co., Cordele, Ga.

During the first month of operation the mechanical cutting demonstrated a marked saving in time and cost. In one day the tractor and mower cleared 67 lots. Five lots, each about 200 by 400 feet, all rather

rough, were cut in 45 minutes, with four men. By hand labor the same operation would have taken five or six men $2\frac{1}{2}$ to 3 hours.

Besides the tractor driver, the Jacksonville operation requires three men. One goes out in front to look for stumps, boulders, wire, or other obstructions, while two follow behind the cutter to trim up the edges or cut weeds by hand in ditches where the cutter does not do a clean job.

The cutter weighs 600 lbs. It has power drive and rotary blades. These blades fold back if a rock or other large obstruction is encountered. The weeds are cut off at the ground level and are left on the ground to dry out or rot. When hand labor was employed the weeds were left in somewhat unsightly piles. Hand cutting was done with an improvised tool similar to a bush hook.

An advantage of the tractor-cutter tandem is that the cutter blades can be picked up hydraulically for movement on streets from one cutting area to another. The tractor can haul the cutter on roads at a speed of 20 to 25 miles an hour.

By city ordinance the weed cutting season in Jacksonville is from June 1 to October 30. Property owners are prohibited from letting weeds grow to a height of more than one foot. If weeds are not cut then, the city gives notice that they must be cut within 10 days. If the property owner does not comply, the city equipment moves in and does the job, sending the property owner a bill for the service, which if not paid within 90 days become a lien on the property.

Up to the end of last July the weed cutter had mowed down high-growing vegetation on 1500 lots compared with 2009 by hand methods during all of 1952; 1270 during 1951; and 638 in 1950.

• • •

Pennsylvania Highway

(Continued from page 63)

of surface. This CP-2 surface was placed as an experimental Moto-Paver job, using 170 pounds of #2-B stone per square yard for the bottom course and 50 pounds of 1-B stone per square yard for the surface course, with 1.25 gallons of Class C oil per square yard.

Very good results were secured from this method with the exception of a slight openness in texture of the surface. We believe this can be overcome by the use of an additional 10 pounds of 1-B stone in the surface course which will provide for more compaction, resulting in a tighter wearing surface.

Costs of this project compare very favorably with other projects of this type which have been constructed by standard methods. This method, using the Moto-Paver for mixing and applying both courses, gives much better results particularly in eliminating spottiness and fatty spots in the surface, which normally results from applying surface courses by the use of a distributor. A very even and consistent mix is obtained.

Bottom course: Supervision \$587.76; labor \$1878.71; equipment \$2500.18; materials \$13,651.39; total \$18,617.94; cost per square yard \$0.4065. Top or wearing course: Supervision \$167.98; labor \$1003.10; equipment \$1189.36; materials \$5692.37; total \$8052.81; cost per square yard \$0.1758. Total cost per square yard \$0.5823; total job cost \$39,800.91; total square yards 45,800; application per square yard, 170 lb. 2-B aggregate, 0.866 gal. C-1 bituminous material; 50 lb. 1-B aggregate; 0.387 gal. C-2 bituminous material.

Low Cost CITY PAVEMENTS in DETROIT

H. B. WILSON, C. E.

DETROIT, along with the automobile industry, has experienced a phenomenal growth in the past twenty years. Being truly a "motor city" with an extremely high incidence of vehicular traffic, Detroit has its traffic pattern well planned. Expressways completed and under construction, as well as wide arterial streets and efficient handling of traffic flow, reflect the farsightedness of the City Fathers.

The construction and maintenance of these streets to support this extensive traffic has of course been a matter of vital importance, and the successful handling of this phase of the picture is worthy of comment, particularly the development of a tough hot-mix bituminous concrete for recapping, and the preventive maintenance measure taken to protect curb and gutter areas.

In Detroit, credit for this is given largely to Charles L. Shattuck, who was for many years Engineer of Asphalt Construction for the Department of Public Works. He has now resigned, but is still available for counsel and advice to the City.

Although a number of bituminous paving engineers still prefer higher penetration asphalts, the study of asphalt pavement surface behavior by Mr. Shattuck over many years resulted in the specification of Petroleum Asphaltic Cement having the characteristics given in Table 1.

These specifications are standard except for a few special provisions. The penetration is somewhat lower than that used by many engineers. The spot test and the Shattuck recovery test have been added. The spot test is used to control the origin of the asphalt. The recovery test insures the stability of the asphalt during the mixing and placing operations.

Other materials employed are: Asphalt emulsion (AE-2) for the tack or bond coat; coal tar pitch

emulsion (Jennite J-16) for sealing all curb and gutter areas; coarse aggregate consisting of crushed stone, crushed slag or crushed boulders; fine aggregate consisting of natural sand or sand prepared from stone, air-cooled iron blast furnace slag or gravel, or combinations thereof.

Mineral fillers used are thorough-

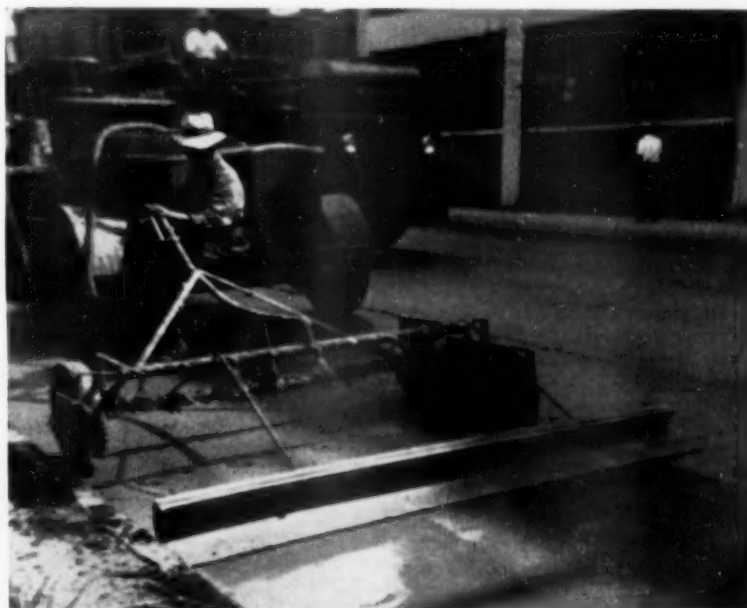
ly dry, finely powdered limestone, Portland Cement, or other artificially or naturally powdered mineral dust. In the event that stack dust (so called "fly ash") is considered, it must contain free carbon to the extent of 7 to 12 percent by weight. The collecting method in obtaining this "fly ash" must be by means of electrostatic precipitation.

TABLE 1—ASPHALT CEMENT CHARACTERISTICS

Specific Gravity 25°C/25°C (77°F/77°F)	Not less than 1.010
Flash Point (Cleveland Open Cup)	Not less than 190°C(347°F)
Softening Point (B&R Method) 46°C to 65°C	115°F to 149°F
Penetration at 25°C (77°F) 100 gms. 5 secs.	60 to 70
Ductility @ 15.6° (60°F) at 5 cm. per min.	Not less than 50 cms.
Bitumen (Soluble in carbon disulphide)	Not less than 99.5%
(a) Organic Matter (Insoluble)	Not less than 0.5%
Bitumen (Soluble in carbon Tetrachloride)	Not less than 99.0%
Spot Test (Oliensis Method)	Negative
Laboratory Oxidation—Recovery Test (Shattuck Method)	

Penetration of recovered sample @ 77°F—not less than 50% of the original sample at 77°F.

Ductility of recovered sample at 77°F—Not less than 75 cms.



● PROTECTING asphalt paved gutters from oil solvents with spray of tar emulsion.



The binder course mixture developed consists of minus 1 1/4 in. well-graded aggregate, the specification requirements of which are: Passing 10-mesh sieve, 15 to 35 percent; and bitumen, 4 to 7 percent.

For the asphaltic concrete wearing course either Type I or Type II Mixtures may be specified as given in Table 2:

A typical recapping project performed this year under contract by the Cadillac Asphalt Company called for: a) Bond coat; b) binder course mixture; c) wearing surface mixture; and d) gutter seal coat.

The binder course was laid over an old pavement which had been prepared for the recapping. Manholes and inlets had been raised to meet the established grade. Corrective measures had been taken to repair or replace inadequate sections. The binder course was of the open-mix type which provided a good bond with the wearing course to follow.

The asphaltic concrete surface mixture was placed by spreading machine from curb to curb for the full width of the street, following the curb line across all intersecting streets. After completion of the wearing surface in this manner, the radii and aprons on all intersecting streets were finished by hand, and adjusted to conform with the new surface, using sheet asphalt mixture for all those areas. This was done, as it was found that the asphaltic concrete, when used on the aprons, had a tendency to ravel under the twisting and turning action of traffic, whereas the sheet asphalt mixture, due to its density, could take this without being damaged.

Marble chips were applied on these sheet asphalt areas to afford better anti-skid resistance, increase the coefficient of reflection and reduce or break up the surface tension of the bitumen film brought to the surface through the rolling, so as to reduce the chance of "hair-checking". Marble chips were not used on the asphaltic concrete as this type of mixture gradually "lightens" in color as traffic wears off the bitumen film and exposes the small stone.

Equipment used during these operations consisted of a Barber-

Greene paver, Etnyre distributor, and two ten-ton tandem Buffalo-Springfield rollers.

Another phase of special interest was the gutter-sealing of the new pavement in a 6-foot width with tar pitch emulsion (J-16). This preventive maintenance measure has been used by Mr. Shattuck since 1944 to stop damage in these areas due to water penetration and solvent action of oil and gasoline drippage from parked cars. Although J-16 is used widely for general preventive maintenance of bituminous concrete, its application for this particular purpose is not widely known among bituminous engineers.

Immediately after the final rolling and while the surface was still warm, sealing operations were started. The area to be sealed was first swept by a Tennant broom. A 3/4-ton Dodge truck, upon which was mounted a tank for mixing and pumping the tar-pitch emulsion, was then moved into position. Towed behind this truck was a Chausse Spray rig with a 6-foot spray bar. The J-16 was transferred by means of a Moyno pump from the mixing tank to the spray bar. The orifice of the spray bar adjacent to the curb was angled to provide positive seal at the curb line. A soft rubber squeegee was used as a drag to ensure uniform application and to obviate any pinholes or puddles. Rate of application was approximately 0.15 gallon per square yard.

Following behind the application of the seal coat and before the emulsion had broken, a light coating of sand, approximately 5 to 10 pounds

per square yard, was cast over the still wet emulsion. While it is recommended that these areas be closed to traffic from 6 to 12 hours, such areas in this case were subjected to traffic in not over two hours without apparent damage. Investigation showed that areas of this project which had cured over several days presented a tough film.

In discussing this unusual phase of the job with Mr. Shattuck, it was learned that Detroit, due to lack of parking facilities permits street parking in a number of industrial and residential areas twenty-four hours a day. These areas have always been a problem because constant standing of motor vehicles with their oil and gas dripping, plus the accumulation of refuse along the gutter lines which tended to cause standing water from rains, resulted in costly and inconvenient maintenance. On the basis of his experience it was Mr. Shattuck's opinion that the use of J-16 tar pitch emulsion has resulted in superior pavement performance, and has reduced maintenance to an absolute minimum in these areas. The basis for this sealing practice is substantiated by the outstanding success which the City of Detroit has had over a period of years with over a hundred miles of this type of gutter sealing.

Inspection of the many miles of bituminous paving done under the foregoing procedure shows that the Department of Public Works in Detroit has kept well apace with the requirements to support the phenomenal growth of Detroit's traffic.

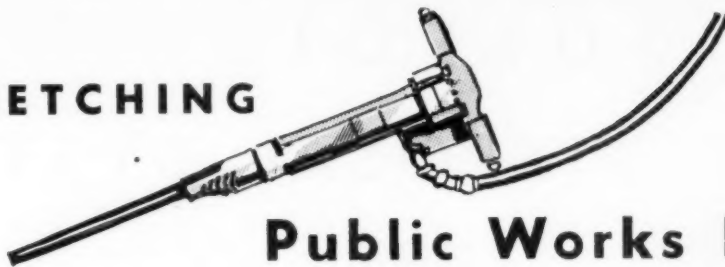
TABLE 2—WEARING COURSE

Passing	Retained on	Type I Per Cent	Type II Per Cent
1/2" Screen	3/8"	10 to 25	- -
3/8" "	10 Mesh	15 to 40	35 to 55
#10 Mesh	40 "	5 to 20	15 to 25
#40 "	80 "	15 to 30	15 to 30
#80 "	200 "	10 to 25	10 to 25
#200 "	- -	6 to 8.5	6 to 8.5
Bitumen	- -	6.5 to 7.5	6.5 to 7.5



● CONDITION of asphaltic concrete gutters two years after applying Jennite.

STRETCHING



Public Works Dollars

with Compressed Air

Photos and Data Courtesy Compressed

Air and Gas Institute

ONE municipality cleans parking meters by putting 12 of them at a time into a tank of cleaning fluid, which is agitated by compressed air. After five minutes, the meters are removed and placed on a drying rack. In another five minutes they are placed in a blower cabinet where it takes only five minutes for final drying. Total time for this cleaning is 15 minutes. Yet more cities than not are still taking four hours for the same thing, cleaning by slower brushing methods.

Another municipality had the problem of supplying water to two new subdivisions on a hilltop, where pressure drop reduced the supply to the minimum during peak loads. As a solution hydropneumatic tanks were installed underground. Each tank had a capacity of 11,000 gallons. Equipment included a 7½-hp pump, air compressor and automatic control equipment. A peak flow of approximately 200 gallons per minute with minimum and maximum pressures of 35 and 45 pounds per square inch was thus provided for the some 130 residences in each subdivision—and a water distribution problem was economically solved.

While on the subject of water-works, there are a number of ways of improving operations by the employment of compressed air. One is to transfer chemicals from car or truck to the point of storage simply by applying air pressure to push the chemicals where wanted. That eliminates the original cost for mechanical pumps and the transfer is performed faster with compressed air.

Laying down or retracing worn traffic strips is another operation which is being accomplished better by the application of compressed air. The city or county which does



● WHEN you have to tear up the streets, air tools will save you money. This article tells other ways that such equipment can be used to reduce work costs.

not have enough of this work to warrant assignment of a pusher truck fulltime can still enjoy the benefits of specially designed equipment. Many types of strippers are available and a detailed description of the operations of any one is not possible in this space, but a highlight description of one city's stripper will at least provide a check list for a street department's methods.

The unit is completely self-contained so any truck may be used at any time for a pusher. It includes an air compressor, 30-gallon paint pot which pumps paint through a "Y" connection to two paint spray guns, either of which may be set for a single 4-inch line or two 3-inch lines.

Air lines from the receiver tank to the spray guns are controlled by a foot pedal, which may be locked for long stripes. Retracing old lines is made easy by means of an adjust-

able cam which is set at the start of the job. A hard rubber wheel controls the spacing accurately because it is not affected by varying weights or changing temperatures.

It is not the purpose of this article to go on indefinitely to mention all the uses for compressed air in public work. Pneumatic diggers help stretch the budget in many ways, air tools add to the efficiency of repair shops, sewage disposal plants have many uses for compressed air and so on. The few illustrations given are rather to suggest untapped possibilities for economies in the operation of all public works departments.

Conceding that where there is the desire and the ingenuity, compressed air can be put to work in many different ways with resulting benefits, it might be well to examine the basic reasons for this fact:

(Continued on page 86)

SUBSOIL SEWAGE DISPOSAL SYSTEM FOR Septic Tank Effluents

E. W. CAMPBELL, Maine State Sanitary Engineer

FOR the disposal of septic tank effluents from isolated public institutions, industrial plants, recreational camps and similar places, engineers of the Maine State Division of Sanitary Engineering, Department of Health and Welfare, developed a system, some dozen years ago, which was based on Maine conditions, skills and materials readily available for use.

In Maine there are many thousands of acres of timberland. The original forests, however, have been replaced with hard woods, such as the various oaks (*Quercus*) and in many cases with hemlock (*Tsuga canadensis*). The prevalence of hemlock throughout much of the state has made it a favored wood for foundations of isolated buildings where permanent construction was not feasible. These timbers were called mudsills and as long as they remained wet in contact with the ground they would last scores of years with little or no deterioration.

Remembering this use of hemlock from childhood days, the author has frequently advised the use of hemlock planks in small septic tanks for baffles and has found that they were very well adapted to this use. When attempting to find a substitute for hard to get tile and other materials for distribution pipes in subsoil filters or absorption beds, the use of hemlock planks came to mind.

A factor of much importance in subsurface disposal is the thinness of the Maine soil. This, in many places is only a few feet deep, often shading off to nothing at all, exposing bare ledges. The construction of deep pits or cesspools, as

practiced in some parts of the country, is frequently impracticable; and, if built, could be expected to result in direct contamination of the ground water in numerous places. This combination of circumstances led to the thought that shallow trenches similar to the distribution lines of subsoil filters could well solve the problem. Such trenches would distribute the septic tank effluents near the surface of the ground where they would be acted upon by the rich flora of the soil; much could escape by evaporation, the balance flowing partly horizontally, with a minimum percolating downward to the water table. Even this would be greatly cleansed as it proceeded downward, thus tending to lessen contamination of the normal ground water and shallow wells or springs supplied by it.

Initially, trenches were excavated to a depth of three feet, then back-filled with a foot of coarse gravel on which was laid an inch board, properly leveled with a grade of not over an inch to 100 feet, so as to promote distribution of the effluent throughout the entire length of such trench. A trough was then constructed of 2-inch hemlock planks consisting of one 10-inch wide plank and one 12-inch, the edges of these planks notched with a saw to a depth of two inches and the portion knocked out with a hammer. Subsequently these were changed to a V-shaped notch 2 inches wide and 2 inches deep. This hemlock plank trough is inverted on top of the board mentioned and continued through the length of the trench. The notches permit escape of the

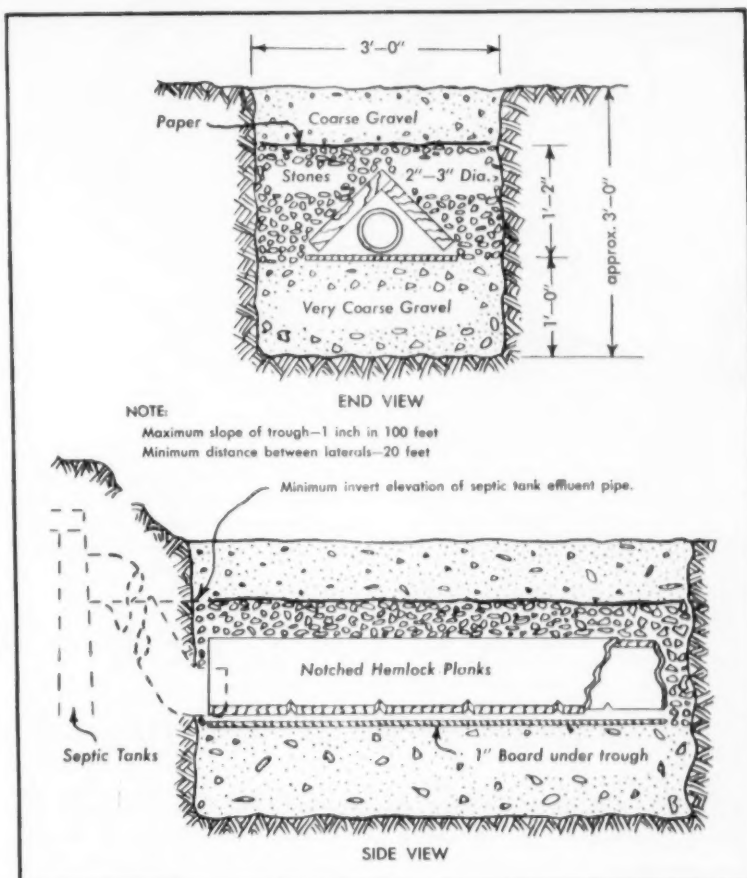
effluent. The manner of laying the planks hold the trough and the board under it firmly in place. Crushed rock or graded gravel of 2- to 3-inch diameter is then filled in around the plank trough to a foot in depth. On top of this graded material a layer of building paper, or roofing paper, is spread the length of the trench. The last foot of the trench is back-filled with coarse gravel to grade, the building paper preventing fine material from the upper foot of gravel from sifting into the graded material around the trough before it could become consolidated. Finally, loam is spread on the surface of the trench to promote reseeding of grass and other normal vegetation. The outlet from the septic tank is inserted into the hemlock plank trough only a few inches and the annular space filled with concrete to prevent the effluent from backing out of this end of the distribution system.

As first planned, trenches were made two feet wide in relatively porous ground, but as much as five feet wide when the ground had a considerable amount of clay in it. With the development of small power shovels of the backhoe variety, and for ease of construction, a 3-foot wide trench has more recently been adopted as a standard.

To estimate the needed length of the trenches, standard percolation tests are made to determine the absorption capacity of the soil, but in all cases at least 50 linear feet of trench are recommended, providing a minimum of 150 square feet of vertical absorption surface. For larger installations, such as hospi-

tals, small industries, recreational camps, etc., the recommendations are a minimum of two linear feet per capita and as much more as may be indicated from the results obtained by percolation tests.

Many hundreds of these subsoil absorption trenches have been installed for boys' and girls' recreational camps, small hospitals, institutions, motels, trailer courts, and private residences. The typical installation, following a percolation test to determine the absorption capacity of the soil, is constructed by excavating a trench three feet wide and three feet deep of the required length (never less than 50 linear feet), and for porous soil estimated as a minimum of two linear feet per capita of population served; for tighter soils the length of trench should be increased proportionately as may be indicated by the percolation tests. Coarse bank gravel, free from material which will pass a 1/4-in. mesh and with no rocks of over 6 in. diameter, is used to backfill for a depth of one foot. The plank trough is constructed by spiking two 12-inch planks, or one 10-inch and one 12-inch, together at right angles, these being kept up-side down so as to facilitate cutting out the V-shaped notches two inches wide and two inches deep at 12-inch intervals on both sides of the trough. A one-inch board 12 inches wide, the same length as the planks, is then nailed across the planks to hold them in place and, when inverted, to form the floor of the triangular-shaped trough. The finished product is then lowered into the trench onto the gravel and adjusted to a pitch of one inch per 100 feet. The space around the trough is then back-filled to a depth of a foot with graded gravel or



● CROSS-SECTION and side view of trench constructed after the Maine method. This utilizes local materials to the maximum and has given satisfactory results.

crushed rock from two to three inches in diameter. It is then recommended that a layer of building or roofing paper be laid over the crushed rock, although this is not essential unless the final filling contains fine material. The last foot is filled with run-of-bank coarse gravel, and if there are fines in it,

then it is very desirable to use the building or roofing paper suggested on top of the crushed rock a foot below the ground surface.

After the trenches have settled they may be made up to grade with more gravel, or if desired, topsoil to promote the growth of grass and other vegetation.



● FIRST step: Board under the trough is laid and stone placed.



● SECOND step: The planks are laid and stone is being spread.



● THIRD step: Trough covered; building paper placed over trench.



● WHAT happens when there is no control of subdivision developments—and what can be done to correct these conditions—are described vividly in this article.

The Impact of a Housing Boom on CITY FACILITIES

R. L. LIPPMAN

City Engineer, Hammond, Ind.

THE post war boom in home construction has created a great many problems for cities. Hammond was unprepared for a boom of the extent that has taken place here. Purchasers of homes were virtually unprotected legally from the actions of contractors who wished to be unscrupulous. We found that all existing laws were set up to control the construction of public facilities only when the city was controlling the financial end. There was nothing to control a subdivider who was paying for his own construction. There were no published minimum standards as to what was acceptable to the city and what was not. Each developer could provide any of the facilities that he wished and could not be required to put in anything that he didn't want to.

A few builders sold homes by showing the model home and then told the purchasers that the city would furnish streets, curbs, alleys, and sewers. Many purchasers need-

ing shelter moved into their new homes before the yards were graded and the facilities finished. Some contractors quit working the moment people moved in. Complaints naturally came to the City Hall. People felt that the city should and could help them out of their difficulties.

In May, 1952, the mayor appointed me as city engineer, and I was faced with the many problems concerned with new developments. The first step in their solution was to write a set of standard specifications that set up in booklet form the minimum requirements of the City Engineer's office. The second step was to get the cooperation of the F.H.A., banks and other lending agencies so they would not accept any structure that had unfinished facilities, such as streets, alleys, curbs, sidewalks, etc. Each agency was asked to refrain from making final payments until he received a letter from the City Engineer.

The third step was to call into the City Hall all builders and developers and explain our new program and issue the mimeographed pamphlets. We immediately started to tighten up on the builders.

The fourth step was to form a committee of builders to meet with the council and the City Engineer to discuss the requirements of the specifications and to assist in drafting a workable ordinance that would be equitable to the builders, to the city, and to the purchasers of homes. After a year of work, many conferences, compromises and some changes, the ordinance for control of subdivisions was passed in July, 1953, and is now being printed in booklet form.

As an indication of the volume of growth in Hammond, W. Hughes Cornwell, Building Inspector, reports the following building construction: In 1948, 1821 permits, \$8,296,981 valuation; in 1949, 1804 permits and \$7,704,530 valuation; in 1950, 2224 permits and \$12,187,594 valuation; in 1951, 2254 and \$12,911,152; in 1952, 2555 and \$11,950,987; and in 8 months of 1953, 2441 permits with a valuation of \$11,828,308.

Subdivision Problems

Here, in summary, are some of the important things we found when we analyzed what was going on in our city:

1) Plats were drawn up but were not field checked, and many dimensions did not prove correct. No permanent corners were established.

2) Grades on curbs and streets were so established by the contractor that many places did not drain properly.

3) Many builders did not submit plans to the city for approval. The city might not find out what was going on until after the sidewalk, curb, or sewer was constructed.

4) Sewer extensions were designed by plumbers; no plans were prepared; the job was started, finished, and covered up before an inspection could be made.

5) Developers, in order to save fill, would lower established street grades, pour curbs and then inform the city that the manholes were too high. Our Sanitary District manholes are solid reinforced concrete. The job of cutting off a foot or two is too ticklish to permit the work to be done by an inexperienced crew. We were stuck with the job. Also, the lower street grades would uncover gas or water lines which had to be relaid.

6) Alleys that became lakes and mudholes were our biggest problem. When two builders were working on opposite sides of an alley, the problem became acute. Each builder claimed to his purchaser that the other would fix the alley. After peo-

(Continued on page 86)

HOW TO TRACE GROUND WATER FLOW

THERE ARE occasions when it is desirable or even necessary to determine the direction of flow of ground water. This is particularly true in cases where more than one well is to be drilled for the purpose of drawing water from the same water-bearing formation. In most ground water formations, particularly sand and gravel, there is a slow but definite movement of the water as a body in a certain direction, and it has been found that a greater yield will be obtained, due to less interference between wells, if the wells are placed so that they are in a line across the direction of the ground water movement. That is, if the ground water movement is from north to south, the least interference and greatest yield will be obtained by placing the wells in an east and west line across the ground water flow. If the natural movement of the ground water is fairly rapid—say a few feet per day—the effect of the location of a line of wells with reference to it is appreciable; but if the movement is very slow—a few inches per day—the effect is slight.

In other cases, a well may show signs of persistent contamination which appears to be originating at some point beyond the well itself. For example, a swamp or nearby sewer may be suspected. Frequently, it is possible to check this by determining if there is a connected flow between any of these possible sources of supply and the well.

Occasionally the tightness of packers, seals, or cementing jobs can be tested by checking the flow into adjacent wells; or the suspicion of contamination due to corroded casings may be checked in the same way. These troubles are more commonly checked by applying compressed air or water pressure to the suspected well; but this will not check the effect on other adjacent wells.

Three Convenient Methods

There are three methods of checking the direction of underground flow which are generally

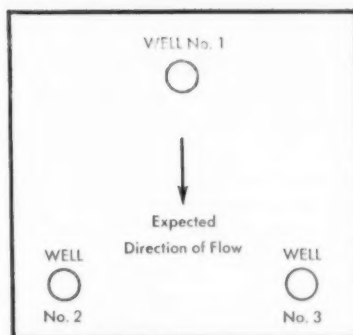


Fig. 1. Triangular arrangement of wells for determining direction of ground water flow by means of color, chemical analysis, or electrical conductivity. Distance between wells increases as the depth of the wells increases. The "expected direction of flow" is usually toward the nearest open body or stream of water; but this may not prove to be the actual direction.

practicable, namely: (1) The method in which dyes are used and the detection is made by color; (2) the method in which soluble salts are used and detection made by analyzing the water to determine the presence or increase in the amount of these salts; and (3) the method in which an electrolyte is used and electrical equipment is set up to check changes in conductivity.

Let us assume that 3 test holes have been drilled into the water-bearing formation in a triangle, as shown in Figure 1, and the direction of ground water flow is to be determined.

The Dye Method

If the dye method is used, the procedure will be as follows:

The dye is dissolved in a pail of water and placed in one of the wells either by pouring it from the top or through a line of pipe. It is best practice to pour it in through a pipe-line rather than merely pouring it into the casing at the top. To do this, a line of small pipe is run close to the bottom and the dye solution is poured down through this small pipe. Enough clear water is then poured down through the

pipe to make sure that the dye solution has all been forced out. During this procedure the other wells are pumped at the same rate, and are watched for signs of the color. Let us say that the wells are numbered as shown in the sketch, Figure 1, with No. 1 toward the north, and that the dye is poured first into well No. 1. If the dye appears at about the same time at wells No. 2 and No. 3, it may be assumed that the natural flow of the ground water is very nearly from north to south. If dye appears in well No. 2 and none or only faint traces in well No. 3, then the flow is in a general northeast to southwest direction. This may then be checked by placing dye in well No. 3 and observing how strong it appears in well No. 2. If no dye appears from well No. 1 into well No. 2 or No. 3, then it may be assumed that the flow is in a general south to north direction or southeast to northwest or southwest to northeast. Checks in well No. 2 or well No. 3, pumping from well No. 1, will then determine the direction more accurately, following the proper clearing of the preceding charge or charges.

It is important that the rate of pumping in these observation wells should be low enough so as not to establish a gradient of sufficient extent to induce an extensive movement of the water toward them, contrary to the natural movement. That is, if a well is pumped at a great enough rate, the cone of influence will induce a flow toward it from the point of location of an adjacent well even though the natural movement of the water is in the opposite direction. This would, of course, result in a false assumption as to the direction of natural flow. By keeping the rate of pumping in an observation well as low as practicable, this error will be avoided.

The principle of this method is simple and can be applied with a minimum of trouble. It must be remembered, however, that there is always the possibility of physical or chemical changes taking

place which might make detection by this method difficult or even impossible.

Kinds and Amounts of Dyes

The dye which is generally used is fluorescein. Fluorescein has a distinct yellow-green color by reflected light, and can be detected by the naked eye when present in as small quantities as one part in 40 million parts of water. With the aid of a fluoroscope, it can be detected when one part is present in 2 billion parts of water. It is not affected by clays and will travel long distances underground without changes in its physical properties. If it passes through peaty formations, however, it is likely to lose its color. This should be borne in mind when checking for pollution from marshes, sink-holes, etc., where peat is likely to be present.

While a very small amount of the dye is detectable, nevertheless, it is best to use an excess. For small wells at short distances, a few ounces are enough; but in large wells at considerable distances, it may be necessary to use large amounts.

With further reference to the use of dyes, see reference (1) which is from a U. S. Geological Survey report on "Fluorescein, an Aid to Tracing Waters Underground," by Herman Stabler, Chief Engineer, Land Classification Board, U. S. Geological Survey.

Soluble Salts Method

The second method is the same as the dye method described above, but any of a number of harmless soluble salts is used instead of a dye, and the check is made by analyzing the water to determine any appreciable increase in the presence of the salts in the water. (2)

Electrolytic Method

The third method has the advantage of being more positive than either of the other methods, especially for detecting the natural direction of flow of ground water when none of the wells is being pumped. It has the disadvantage of requiring some special equipment, none of which is expensive, however.

Referring to the sketch, Figure 2, it will be noted that an insulated copper wire is grounded at well No. 1, and two insulated copper wires lead from this ground to well No. 2, one going through a number of ordinary dry cells and an ammeter to a ground on well No. 2, and the

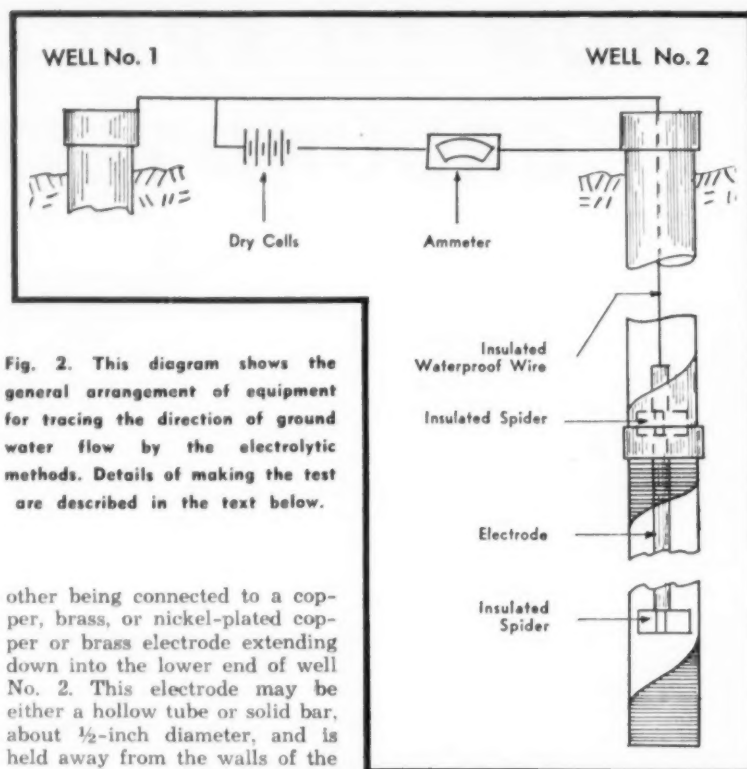


Fig. 2. This diagram shows the general arrangement of equipment for tracing the direction of ground water flow by the electrolytic methods. Details of making the test are described in the text below.

other being connected to a copper, brass, or nickel-plated copper or brass electrode extending down into the lower end of well No. 2. This electrode may be either a hollow tube or solid bar, about 1/2-inch diameter, and is held away from the walls of the casing or screen by means of any kind of insulators, such as wooden spools.

The ammeter should be sufficiently sensitive to read at least in one-tenths of an ampere. Enough dry cells should be connected in series so that an original reading of from 2/10 to 4/10 amp. is shown when the current of the cells is thrown on. This indicates the normal conductivity of the soil and water.

Some strong electrolyte is then placed in well No. 1. About the best electrolyte to use is common *sal ammoniac*. The most convenient way to handle it is to make a perforated bucket out of sheet steel or brass, put about 15 to 20 pounds of granulated *sal ammoniac* into it, and lower it to the bottom of the well. If the flow is from well No. 1 toward well No. 2 there will be a definite increase in the conductivity which will show up in a very noticeable and rather rapid increase in the reading of the ammeter. A second check with the third well will establish the exact direction of the flow of the ground water. If no increase is noticed, the wires should

be reversed to run from well No. 2 to well No. 1; or well No. 2 to well No. 3; or well No. 3 to well No. 2; thus getting a check in each general direction. (3)

In checking possible sources of contamination, the dye or electrolyte is dumped into the suspected sources, and a check made by watching the well, as described above.

Occasionally, these results may be misleading because there is always some possibility of failure of the dye or electrolyte to appear in sufficient quantities to be noticeable, whereas a definite flow actually exists. On the whole, however, the chance for error is so small that the results may be accepted with reasonable assurance that they are Geological Survey.

Bibliography

- (1) Mimeographed Report indexed as D-1 in Bibliography W.S.P. No. 992, U.S.G.S.
- (2) For further information regarding this subject, see "Use of Fluorescein in the Study of Underground Waters," by R. B. Dole, U.S.G.S. Water-Supply Paper No. 160, pp. 73-85.
- (3) For further information see "Description of Underflow Meter Used in Measuring the Velocity and Direction of Movement of Underground Water," by C. S. Slichter, U.S.G.S. Water-Supply Paper No. 110, pp. 17-31.

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TAX-FREE MUNICIPAL PARKING PROGRAM

-it WORKS

OPENING of the new \$450,000 Maynard Street Carport by the City of Ann Arbor, Mich., in November, 1953, marks the culmination of an orderly parking program established on a self-financing basis. It has achieved effective results without tapping the general city fund.

The basic ingredients of the Ann Arbor plan include: 1) Strategic location of lots close to the points of maximum requirement, ringing the basic business areas in effect. 2) Coordination of parking authority in a separate Ann Arbor Parking System, including parking meters, lots, and carports. 3) Centralization of finance in this authority, with all revenue pledged to use for parking facilities. 4) Operation at minimum fees and with provision of maximum parking convenience.

The entire parking system is primarily the creation of the city's dynamic five-term Mayor, William E. Brown, Jr., the type of executive who makes his job his hobby. Recently a representative of the United States at the international conference of mayors in Vienna, he delights in visiting other towns everywhere to see how they do things. His personal business background includes the former operation of a private parking lot and experience in the investment banking

HAVILAND F. REVES

field—both factors giving him an insight into the solution of the city's parking problem.

Statistics illustrate the problem: population, 48,000; area, 7 square miles; and car registration 25,000, plus 3,500 operated by University of Michigan students. Two distinct business centers, separated by a few blocks, complicate matters.

Locations were selected, not because they were available, or because they were cheapest, but because they were found by study to be the best to serve the needs of nearby business. All were picked for permanent parking use, with the further objective of ultimate expansion vertically—above or below ground as conditions may make desirable. Multi-story automatic parkers are considered possible for the future on some of the lots.

The essential point is that the lots are selected to provide maximum parking utility. The Maynard Street unit is the second instance of a lot developed into a three-story carport.

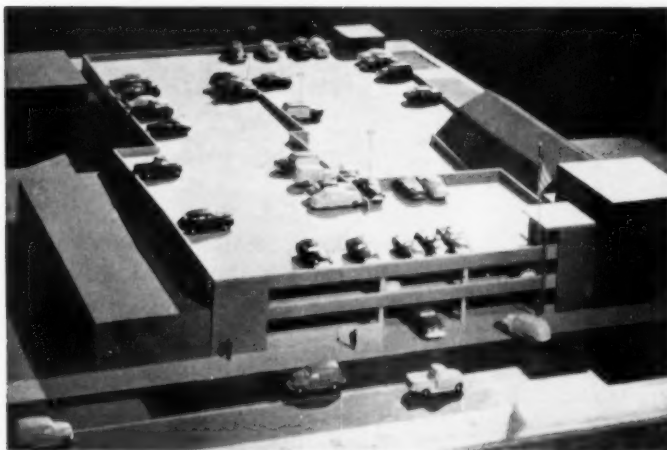
Evidence is ample that the lots have been well chosen—there are seven in all today, including two

small metered lots. In some cases it would be possible to sell the property at a notable profit, but plans are to retain the lots because they are properly located for their purpose.

Policy of Responsibility

The city as a matter of policy assumed the responsibility of providing adequate off-street parking for cars within the important downtown area. This included the repeal of an ordinance which required parking to be provided for any new construction within the central area, as well as for any rebuild job if the extent of damage or replacement extended to 25 percent. These desirable requirements had had the unfortunate effect of discouraging new building and modernization of the business district. The solution was found through the stimulus given by off-street municipal parking.

As viewed by Mayor Brown, parking has become an essential public service, like water supply, and the data available indicate that the provision of this municipal service is an important one to the community. It has been evidenced by the stimulus to business. Some nearby realty values have doubled, and a significant number of major store improvements have been



● **MODEL** prepared by the architects to show how the new Maynard Street Carport would look on completion.



● **THREE LEVEL** parking garage which has grown from a municipal parking lot as the parking plan developed.

made, spreading business activity all along the line.

Cooperation of other city departments has been essential, especially the Police Department because of the importance of traffic and parking control. That department in turn is eager to work with a well-formulated traffic plan because of the high level of traffic safety resulting.

But the basic coordination of parking authority in a single responsible body was found necessary. This included the possibly debatable inclusion of street parking meters, as well as the actual parking lots. Use of meters on two lots makes this a natural policy. But parking lots and carports alike are all viewed as merely different aspects of parking, and require unified control accordingly. Since the basic emphasis of the program is upon adequate off-street facilities, too great attention to street meters could work to defeat the basic policy—or the converse could happen as well.

A separate responsible financial unit having control of the entire revenues and disbursements of the parking system is one key to the success of the Ann Arbor system from the economic point of view. When the first experimental lot was opened, the general fund was called upon, but the system was immediately thereafter placed upon a self-supporting basis.

Especially remarkable is the fact that it has been self-financing from the capital standpoint. Money for acquisition and construction of facilities has been raised by three series of revenue bonds in the substantial amounts of \$300,000, \$330,000, and recently, \$465,000. All revenue of the meters and lots is pledged against these bonds, and they have proved an attractive offering to investors at 2½ and 3 percent.

During the past year the Parking System was able to pay off bonds in the amount of \$40,000, purchase equipment costing \$4,322.45 and have \$27,841.12 available for extension of facilities out of its net income for the year of \$72,163.57. A study of the financial reports, available in detail from the System, and duly audited, shows that sound accounting procedures are being followed. Gross revenue was \$151,855.73 and general operating expenses \$54,571.73, giving a net revenue figure of \$97,283.79. Interest payments of \$17,833.33 and a depreciation charge of \$9,590.22 reduced this to \$69,860.24; and \$2,303.33 miscellaneous

income, representing interest on investments, raised the net income to \$72,163.57.

Revenue from parking facilities during the year included \$30,994.37 from parking lots, \$25,632.60 from the one carport operating, and \$90,739.18 from 850 street meters—a total of \$147,366.15. The lots and carport parked a total of 299,742 cars during the year—or better than six cars for every resident of the city.

Fees are kept low—ten cents for the first two hours is the minimum, with a nickel for each additional two hours. The meters provide briefer parking possibilities at comparable charges of one cent for twelve minutes, five cents for an hour.

Operating hours are from 7:00 a.m. to 6:30 p.m. normally. Evening theatre parking is provided at the Maynard Street unit for 15 cents after 6:00 p.m.

Design of the lots has been planned to facilitate customer parking of cars. This not only reduces labor costs of operation, but makes it more convenient for each patron to get in and out. This is typical of the basic operating philosophy—that parking is a service to the

public, to be provided as near to cost (including amortization of investment) as possible, and under conditions giving the maximum in customer convenience.

Climax of an eight-year parking program is the 371-car Maynard Carport. Of typical reinforced concrete construction with a continuous ramp, it is virtually unique in municipal facilities. It is placed between the main downtown and university business sections, ideally situated to service both as well as the evening theatre traffic.

Completion of the latest addition gives the Ann Arbor Parking System off-street spaces for 1,164 cars which is about five percent of the total very high registration. (It should be noted that the University provides off-street parking areas for 2,450 cars for staff and students, relieving substantially the transient problem in the campus area).

"Sensible parking is a necessity," Mayor Brown says. "It hasn't cost the taxpayer a cent of money—and provides parking at a ridiculously low price."

Next year, he predicts, the net revenue will run to \$150,000, with the new carport in regular operation.

Dry Ice Helps Determine Bridge Length

Most folks use a ruler to measure something. The Oklahoma state highway department used dry ice to determine the length of the 3,750-ft. bridge it will spend some \$3 million to build across the South Canadian river southwest of Norman. George E. McCamy, the department's materials engineer, explained the unusual engineering procedure, which he said is original as far as department engineers can determine.

The big problem was quicksand, of which the South Canadian undoubtedly has one of the world's most abundant supplies. The department can build dirt fills more cheaply than steel bridges, so it had to find out how far out from each bank it could build the fills and be safe from shifting sand.

McCamy's research engineer, R. A. Helmer, knew his job was to take samples of quicksand all the way across the river. How to reach down under a river bed and come up with a sample of quicksand without losing any of the sand or water was the initial problem that was pre-

sented. Small tubes were forced down into the sand at intervals across the river. A bigger casing was inserted around the tube. Sand and water between the smaller tube and the outside casing were excavated and replaced with dry ice, which froze the sand and water in the smaller tube. The smaller tube then was pulled from the hole and inside of it was the quicksand sample just as it lay many feet below the surface. As a result of the tests, it was determined dirt fills could be safely built out from each side to within 3,750 ft. of each other—that meant a 3,750-ft. bridge to span the gap. From Excavating Engineer via Highway Research Abstracts.

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Controlling Traffic During Maintenance Operations

Most states use maintenance personnel to control traffic during maintenance. The Connecticut State Highway Department is having the state police train highway men who will be deputized after a two-week training period. These men will wear uniforms but local police will attend to prosecutions.

Westchester County Builds

NEW SEWAGE WORKS

\$6,000,000 PLANT TO BE COMPLETED THIS FALL

WESTCHESTER County in New York State has embarked on a program of building adequate sewage treatment plants to protect the waters of Long Island Sound and the Hudson River. First unit in a multi-million dollar program to extend over the next decade is the New Rochelle Sewer District Plant in New Rochelle, N. Y. Construction began in the summer of 1952 and will be finished by September, 1954.

When completed this plant will give primary sewage treatment and disinfection to 15 mgd of sewage and will handle up to 31.5 mgd during storm flows. The area contributing to the plant will include the City of New Rochelle, the Village of Larchmont, part of the Town of Mamaroneck, and part of Pelham Manor, with a design capacity of 81,000 persons.

Constructions Contracts

Work on the project is being done in several consecutive contracts. The first contract was for approximately \$1,000,000 and consisted of sub-aqueous construction of a 54-in. outfall line extending 9900 ft offshore into Long Island Sound. That part of the work was completed in the fall of 1952 and the line is now in use to handle sewage from the old screening plant in New Rochelle. Inasmuch as the old outfall sewer was only half the length of the new one, improvement has already been noted in the beaches along the Sound in the area served. When the treatment plant goes in operation next year the beaches will be even better.

Construction at the plant site began in Sept., 1952, with clearing of the site and excavating for substructures. More than 40,000 cu. yd. of rock were blasted and removed.

Some of the spoil was used to build up the grounds along the shore and for riprap of the ground above the sea wall. Work on the substructures and sludge digestion tanks began last

winter and was completed last fall. The cost of this part of the construction was approximately \$2,000,000.

One of the problems of construction on the sub-structure contract



● POURING concrete for substructure of the main office building which will house offices, laboratory, chlorine feeders and ventilated grit chamber room.



● THERE will be four sludge digesters. Main building is in foreground.

was water in the trenches. At times as many as a dozen gasoline-driven pumps were in use; these were 3-in. to 10-in. centrifugals. Heavy construction equipment came and went as needed. At times as many as six cranes were in use; two were Lima 85-ft. boom units. Three truck cranes were on the job as well as a shovel, backhoe, half a dozen bull-dozer and seven air compressors used mostly as drill runners. Small equipment included Homelite portable generators, pick up trucks, etc.

Future Contracts

Last August bids were taken for the equipment and superstructures of buildings and future contracts will include two interceptors (one to Hudson Park and one to Larchmont) and two underwater double siphons to bring the sewage from the mainland across an inlet of the Sound to the point on which the plant is located.

The plant site is just across a water inlet from an established residential neighborhood. For this reason the superstructure of the plant buildings will have fine architectural treatment and the grounds will be landscaped in harmony with the area.

When completed, the plant will contain a pumping station; grit chambers; screen room; sedimentation tanks; chlorination station; sludge digestion tanks; and incinerator building housing flash dryer incinerators. The digested sludge will be elutriated before it is

dewatered on Komline-Sanderson vacuum filters. The sludge may be dried for fertilizer use or burned to ash and used for fill. The incinerator building will have a stack 125 feet high to protect the surrounding area from fly ash. The main building will house a laboratory and offices. Prechlorination will be practiced with a capacity up to 10,000 lb. per 24 hrs. Chlorine can be added to the bypassed sewage during storm flow. Chlorine will also be added at the Larchmont pumping station, which will handle a flow of up to 3 mgd. Upsewer chlorination will also be practiced on the Hudson Park interceptor.

Engineers and Contractors

The design of the plant and appurtenances was done by the Department of Public Works, of Westchester County, under the direction of James C. Harding, Commissioner of Public Works, and Lawrence G. Rice, Consulting Engineer on the project. Design of the two interceptors will be done by outside consulting engineering firms, one by Metcalf and Eddy of Boston, and the other by Malcolm Pirnie and Associates of New York City. Resident Engineer on construction for the County Dept. of Public Works is Ed Marsh.

The contract for the substructures, now nearing completion, has been performed by Poirier and McLean, contractors of New York City, under the direction of James Quinn, Sup't., and Robert Johnson, Engr.

Watershed Improvements Save Money in Treating Water

In cooperation with the local soil conservation district, Shawnee, Okla., three years ago began a program to stop erosion on 1,600 acres of city-owned land around a 300-acre lake which serves as a reservoir for the city water supply. Success in keeping red soil out of the lake has led farmers in the watershed area to adopt similar conservation plans. Many summer homes have been erected on the shoreline and the lake is widely used for recreational activities. The city spent \$8,500 on its conservation project, and net savings in operating costs last year totaled \$15,000, chiefly in the reduced cost of treating the water. Conservation was effected by seeding the land to grass, building 79 de-silting basins and 12 miles of diversion terraces, and building firebreaks to protect grass and trees. Public Management.

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Efficient Selection of Equipment

Five basic points on the selection and ownership of equipment were presented by A. E. Holt at the Fifth California Highway Conference:

"1. In selecting a new piece of equipment make sure that its ownership is economically sound and that there will be sufficient future work to justify its initial purchase before it becomes obsolete or non-competitive.

2. Select equipment more for its universal use than for specialized jobs. (For instance, this is especially important in those areas where snow-and ice-removal equipment is used only for a few months out of a year. Those districts should purchase as much standard equipment as possible upon which auxiliary snow and ice-removal equipment can be attached when needed.)

3. Make every attempt possible to standardize not only the major equipment units but also their power plants and auxiliaries as well.

4. Set up and establish rigid rules and procedure for regular inspection and preventive maintenance work.

5. Do not over-equip any job or district, because idle equipment becomes a financial drain and is of no value."

● DIGESTER at left rear; sedimentation tanks at right rear.





● LAYING the intake pipe: After a channel was dredged, the pipe was placed and covered with gravel, in two layers, and clay, sealing off river water.

NEW TYPE WATER INTAKE PROVES SUCCESS

A. R. TODD, P. E.,

Wheeling, W. Va.

A NEW type water works intake, designed on the pattern of rapid air field drainage, was designed by the author in 1951 for Bellaire, Ohio. It consisted of 400 feet of 24-inch reinforced perforated concrete pipe laid on a shale bottom 22 feet below the Ohio river bed and 100 feet offshore. The depth of the water at that point was 12 feet.

The perforated pipe is connected to a cell or caisson on the river bank by means of 24-inch not perforated reinforced concrete pipe. This pipe was used to avoid entrance into the line of any hillside or ground water, which has a hardness of 750 ppm.

The bottom of the cell is slight y below the intake so it was possible to have the intake pipe on a falling grade. The cell is 7 feet in diameter with 2-ft. walls, and is 41 feet deep. Three Byron Jackson submersible pumps were installed with the controls in the Water Works Building some 600 feet away.

Since the cell during flood stage may be under 35 feet or more of water, the cell was made watertight with a 2-inch vent pipe extending up a telephone pole 45 feet into the air. Sufficient reinforced concrete

was used in the cell to prevent floating under any circumstance. The cell was installed during the summer of 1952, but the intake was not installed until July, 1953, because of a delay in obtaining the 24-inch intake valve.

How Intake was Laid—The M & O Dredging Company, which had the contract for the river work, laid the pipe as follows: The first 11 feet of river bottom which consisted of muck, sand and gravel was cast on the river side by the dredge boat. The next 11 feet consisting of good clean gravel was cast on the shore side and a trench 9 feet wide at the bottom and 45 feet wide at the top with a fairly level bottom and very little cave-in was secured. Three feet of 2-in. gravel was placed over the pipe, followed by 11 feet of the ¼-inch clean gravel that was cast shore side. Then 2 feet of clay was placed, and a drag consisting of two pieces of 12" x 24" beams bolted together was dragged several times over the top of the trench. After this, the top part of the trench was filled with the river bottom material that was cast on the river side. That

Table 1—Analyses of River and River Intake Water

	River Water	River Intake
Turbidity, ppm	23	0
Temperature, °F	73	68
pH	6.3	7.2
Total Alk., ppm	15	160
Total Hdn., ppm	160	360
Chlorides, ppm	22	35
Iron, ppm	2.5	0.1
Fluorides, ppm	0.1	0.4
Manganese, ppm	0.4	0.2



● PERFORATED concrete pipe was used. Note rubber jointing rings.

the river water was sealed off completely was evidenced by the fact that the water cleared up within four hours after the pumps were started. The Universal Concrete Pipe Company furnished the 24-in. pipe, both the perforated and the plain. The reinforced concrete pipe was laid with rubber joints and under the direction of a diver.

Results Exceed Expectations — On September 18th, 1953, the pumps were tried out and were left on for four hours, by which time the water had fully cleared up. With all three pumps on—total capacity 6 million gallons—it was impossible to lower the water in the cell more than a few inches. By partly closing the intake valve and running all three pumps, the water was lowered 15 feet but when the valve was again opened wide, the water immediately rose to its previous level. It is believed that 10 or 12 million gallons per 24 hours could easily be obtained.

Type of Water Obtained—Comparison of the analyses of the river water and the water obtained below the river bed shows no relationship, as indicated by the samples shown in Table 1, which were taken Sept. 21, 1953.



● CLAM-SHELL mounted on barge takes out silt but finds no piano.

SILT REMOVAL

from a City Lake

LOCATED a stone's throw from the heart of busy, metropolitan downtown Oakland, California, and surrounded by a beautiful tree-studded public park, Lake Merrit has, at last, become so heavily burdened with deposits of silt that city engineers have been forced to arrange for an all-out, large scale dredging program.

A terminal and catch basin for several large storm sewers, the lake, approximately 160 acres in area, was developed from an early-day tidal inlet of the Oakland Estuary and has, for many years, been controlled in depth by a weir located at a point adjacent to the Municipal Auditorium and Civic Center.

The present condition is, of course, highly objectionable from the point of view of boating enthusiasts who must exercise great care so as not to become stranded; and, also, from the point of view of property owners nearby whose land becomes flooded because of inadequate storm drainage during heavy rainfalls.

In trying to solve the problem of

GEORGE F. BURNLEY

increasing the over-all depth of the lake to 10 ft., engineers rejected proposals for a program of conventional suction dredging since the only practical depository for the removed silty material, which contains some organic matter, would be at a location where appearance and odor would be prohibitive.

The idea of driving sheet piling along the higher parts of the shoreline was also discarded as destructive of the existing esthetic qualities, inadequate, and expensive.

Thus, the only remaining alternative was adopted—that of removing the debris by clamshell bucket and hauling it off by truck. In solving the problem of how to do it for less, Paris Bros., local contractors, assembled a group of war-surplus watertight steel cubes formerly designed for use as barges, docks, etc., and welded them into a pair of 100-ton hopper scows and a work barge, to support a Bucyrus-Erie crawler crane. Likewise, as a "mule" a

smaller barge was constructed and fitted with an oversize war surplus outboard motor.

Finally, as the project got under way, a truck-mounted Lorain fitted with a 1 cu. yd. bucket tagged along the shoreline after the "fleet", transferring the muck from the hopper barges to a group of non-drip dump trucks which, in turn, disposed of it at a point some ten miles distant.

Removing the silty, organic debris by this method costs about \$2.63 per cu. yd.; it is estimated that the total cost of the contract will run in the neighborhood of \$100,000.

As an interesting side-light to the matter, bystanders and sidewalk superintendents gawk curiously at the clamshell busy in the lake and offer comments as to the objects which might be recovered. It has been recalled that, among the various tools, cameras, jewels, etc., that have been dropped into the lake, a grand piano was once tipped into the water from the decks of a launch carrying a group of party-goers.

But it hasn't been found yet.

SPEED LAWS

RE-EXAMINED IN VIRGINIA

HERBERT R. PERKINSON, JR., Associate Traffic & Planning Engineer, Virginia Department of Highways

EACH year automotive manufacturers proudly unveil their latest models, which invariably offer the motoring public greater horsepower, smoother riding, larger brakes and many other features designed to facilitate the safe and efficient flow of traffic on our highways. Yet many State and local governments responsible for the maintenance of the streets and highways of the nation have failed to keep abreast of these improvements by neglecting to establish reasonable and well posted speed limits.

It is not uncommon to see main highways through small villages or sparsely populated outlying districts of cities and towns signed for maximum speeds of 25, 30 or 35 MPH. Investigations of most such cases reveal a startling fact: these archaic zones were established 20, sometimes 25, years ago when the original highways were constructed. There

For several years Virginia has recognized the need for a reappraisal of all zones under State jurisdiction. However manpower and equipment shortages during and immediately following World War II delayed the initiation of a State-wide program on re-zoning until 1951.

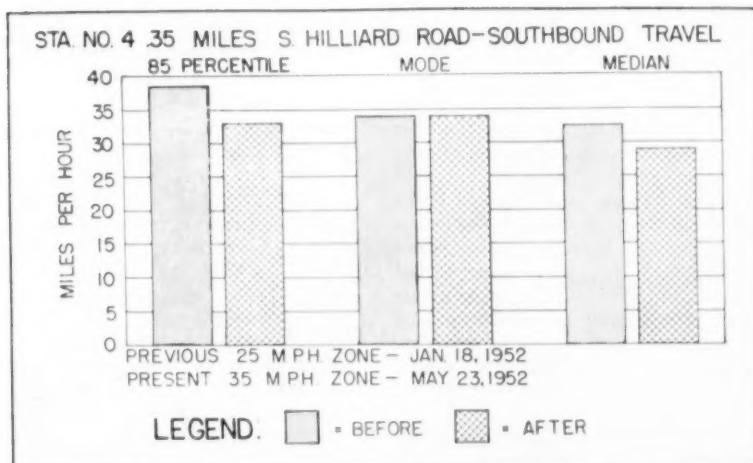
Virginia law requires that a traffic and engineering investigation be conducted by the State Highway Department before any speed zones below the usual rural limit of 55 MPH can be installed. Exceptions are heavily developed residential areas, business districts and school zones when children are entering the grounds, where 25 and 15 MPH limits automatically prevail.

Since the State Highway Department maintains approximately 46,000 miles of highways, including the streets in all incorporated places of less than 3,500 population, it was decided to restudy the main trunk

existing limits appeared low or where restudies were needed for any reason. In addition, many other such zones were pointed out by the State Police, the AAA and interested citizens. Very rarely a Town Council or Civic Association asked that higher zones be provided.

Three traffic technicians have been assigned to the studies, all experienced or trained in speed zoning studies. Insofar as possible, the same technician is assigned all studies on a given route to insure greater uniformity. Before beginning the studies, the technician calls upon the Resident Engineer to inform him of the surveys and to obtain any general data regarding the existing zones. In the cases of incorporated places, wherever possible, a short courtesy call is paid the Mayor or the Chief of Police.

The technician, or party chief, and his helper then make a trial run



● LOWER SPEED in revised zone after increasing speed limit shown graphically.

is little wonder that local authorities complain that motorists consistently exceed the speed limits in these situations. While they cannot effectively be enforced, these unrealistic speed limits are definitely an irritation to the motorist and, on occasions, they encourage the operation of so-called "speed traps."

highways first, then the remainder of the Primary System, then the Secondary System, in that order.

Starting the Project

The District and Resident Engineers were instructed to submit to the Traffic and Planning Division a listing of all places where the



● UNBEKNOWN to drivers, vehicle speeds are being recorded by radar.

through the zone, floating with traffic, to observe the roadway conditions and the extent of the marginal development. During the run two or more speed check points are selected. After the rough log of the above is completed, a radar speed meter is put into operation at the selected station and recordings are taken of the speeds of all vehicles passing the station. The speeds of vehicles parking or slowing to make turns are discarded. The meter is usually set up in the rear of the study vehicle and beamed along the highway at a 15 to 30 degree angle, depending on the distance of the study car from the traveled way. Since the equipment is generally operated by battery, checks can also be run with the radar screen well removed from the vehicle and effectively camouflaged by an old packing box, papers or the like.

An attempt is made to secure the speeds of at least 200 vehicles at each station, and these are listed separately for each direction of travel. At some time during the day's work, the meter readings are checked by passing the screen at various predetermined speeds. These runs are generally made with the enforcement personnel, at which time the police are questioned as to the practicability of the existing zone.

Once the field study is complete, the technician tabulates the results of the speed checks to show the breakdown of the speeds by various increments. From this information the 85 percentile, model and median speeds are computed. (The 85 percentile is the speed below which 85 per cent of the observed vehicles were traveling past the station; the model is the speed range in which the greatest number of vehicles observed to be operating; the median is the 50 percentile.)

He then prepares a report in which a recommendation is made either to raise, lower or retain the existing zone. In making the recom-

mendation, the technician is instructed to consider the following factors:

- (1) General geometrics of the route, particularly the design speed.
- (2) Extent and type of marginal development.
- (3) Overall sufficiency rating of the control section within which the zone is located.
- (4) Accident, injury and death rates for the past two-year period.
- (5) Prevailing speeds of vehicles observed by radar checks.
- (6) Suggestions of the State Police with regard to enforcement.

In addition to suggesting the proper limit, the studies are very helpful in assuring a uniform method of signing. Mention is also made on the report of old signs which should be replaced or re-conditioned, the need of new signs, conditions of oversigning or poor placement, and whether or not pavement messages are in order.

Theoretically, speed limits should be set near the maximum speed at which the average good driver will operate his vehicle under given conditions. Traffic engineers and police authorities are agreed that to be effective, the limits must be self-enforcing. Accordingly, in Virginia every effort is made to set the new limits high enough to include the 85 percentile speed.

The technician's report and recommendations are received by the traffic engineer, reviewed, and then forwarded to the District and Resident Engineers of the area in which the study was made. In unincorporated areas, the field engineer then advises the Division Commander of the State Police that certain changes in zoning are justified, and then proceeds to have the appropriate signing adjustments completed. In the incorporated places, the Resident Engineer meets with the Mayor and informs him of the results of the study, explaining the necessity of posting uniform and reasonable limits. While a

majority of the town officials readily accept the results of the surveys and recognize the need, there are cases where the local governing authorities do not concur. In this event, a traffic engineer, with the Resident Engineer, calls on the Mayor or meets with the Town Council to discuss the overall problem with them in detail. Although the Highway Department is solely responsible for all marking through the smaller communities, a sincere attempt is made to obtain the approval of town officials before the changes are made.

"Before and After" speed checks have been used effectively in several instances to prove to the dubious officials that the same general speeds will prevail even with higher limits. The same stations used in the original surveys are re-run three or four weeks after the zoning adjustments have been completed, and under comparable conditions. Data sheets are then computed and graphs plotted to show a direct comparison. Invariably, there is little recognizable difference in the various speeds; and in most instances the higher limits result in slightly lower operating speeds. This decrease is probably brought about because a majority of drivers are more willing to abide by what they consider an understandable regulation, and also due to the more adequate signing and marking of the newer zones. "Before" and "After" studies have also been made of the accident rates, with the same overall trend—more reasonable speed yields improved accident experience.

One interesting case is recalled. A civic group in a suburban area was vigorously opposed to any increase in an existing 25 MPH zone. They stated that the route in question was being used as a race-track for through vehicles, and, of course, complained that these foreign drivers were unusually reckless. While the route was considered a local road and the Department was not aware of such a situation, rechecks of the speeds were scheduled. However, in addition to recording the speeds, the observers also noted the license numbers of all vehicles exceeding the posted limit. The numbers were then



● SPEED ZONES outdated by modern conditions and vehicles are reviewed to set reasonable limits.

checked with the Motor Vehicle Division, and it was determined that (1) practically everyone was exceeding the zone speed by 10 to 20 MPH, and (2) over 90% of the violators were local citizens, of which a large number were members of the civic group. Needless to say, the zone was properly adjusted without further difficulty.

To date, studies have been completed in more than 200 locations throughout the State, involving some 450 speed check points. Of the 200 locations, the zones were raised, or shortened, in 189. Aside from the patent initial opposition to the changes, all adjustments have been completed without incident.

While the Department is encouraged by the results already obtained, it is realized that only a start has been made in the right direction and that hundreds of similar studies must be conducted to modernize our speed zones. In addition to accelerating the engineering program, much missionary work must be done in the field of public relations in order that the local governing authorities as well as the public in general may have a better understanding of the proper use of speed limits. Eventually, it is hoped, reasonable and well-posted limits will be in force on every mile of Virginia's 48,000-mile highway system.

WASTE TREATMENT MAINTAINS AEROBIC CONDITIONS

J. A. LINDSEY AND R. L. SMITH, Consulting Engineers

A WASTE treatment plant is being constructed in Delano, Minn., which employs features not too common to the average treatment plant and, in total group, unique in the Delano plant. The plant employs five features that are not in common use: First, pre-aeration under pressure; second, short term primary settling based upon 2000 gallons per sq. ft. rise; third, the use of an equalization of flow or dilution tank; fourth, the return of recirculation liquor from the race of the final Spiraflo type settling tank; and fifth, the use of chemical treatment of sludge.

The plant design is based on a raw sewage flow of 175,000 gallons per day; an equivalent population of 3100 (512# of BOD); a 12 ft. diameter unmechanized Spiraflo settling tank; a 33 ft. tile media housed aero-filter; a 20 ft. diameter Spiraflo final settling tank; and 810 square feet of housed sand bed for chemical treatment of solids. The plant includes approximately 15,000 cubic feet for garage storage of village street maintenance equipment. The holding tank has a capacity of

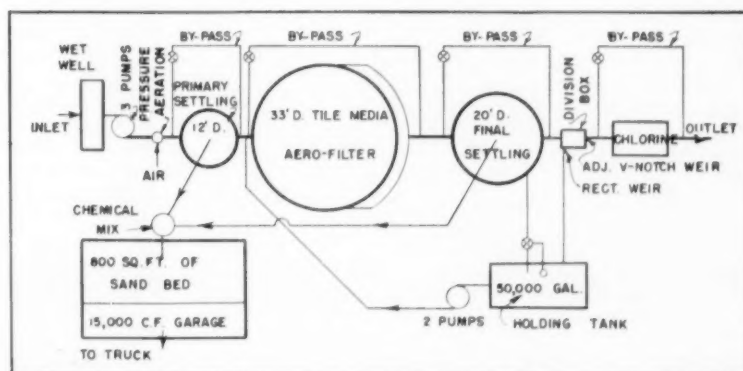
about 50,000 gallons. The cost was \$138,000 of which about \$115,000 is the cost of the treatment plant itself.

Pre-aeration of the sewage, under pressure and in the presence of a measured amount of oxygen, was added to the treatment process for a cost of less than one percent of the plant cost. The equipment consists of a tank holding about one minute's flow of raw sewage; an air intake with measuring device; and

by-pass provisions. The tank is inserted into the raw sewage pump discharge line and pressure in the tank is maintained at twenty pounds. The placing of the raw sewage or returned sludge supernatant from the settling tanks under a pressure of 20# psi in the presence of air will increase the solubility of the oxygen and will satisfy all of the immediate (chemical) demand of the sewage thus reducing odor troubles, increasing the treatability of the waste and preventing troubles common to anaerobic supernatant liquors, whether from a digester or settling tank hopper.

Short Term Primary. This type of unit is an improved substitute for the fine screen primary common in this part of the country where milk, meat and vegetable processing are the source of the more common industrial wastes. The short term prevents septic conditions and records of the operating plants indicate entirely satisfactory treatment. The elimination of mechanism reduces the up-keep costs and the initial low cost is quite attractive.

Equalization or Dilution Tank. At a point between the final settling tank and the chlorine contact tank, the plant includes a division of flow box, one end having an adjustable V-notch weir before passage to the chlorine tank. The other end of the tank has a fixed rectangular weir leading to the holding tank. The holding tank has a capacity of about 50,000 gallons and, assuming that the V-notch weir could be set exactly at the beginning of a 24-hour period, it would be possible to produce a relatively even 24-hour flow and to reduce the strength of the waste leaving the plant. In fact, it is believed that the effect of the tank will be to provide treated or



● FLOW diagram and layout of Delano plant, which uses short-term primary settling, but provides pre-aeration and chemical treatment for the sludge.

dilution liquor for recirculation purposes. The holding tank includes a connection with the race of the final tank, this connection includes a float operated valve that will add liquor from the final tank race should the V-notch adjustable weir control fail to return sufficient liquid. It is to be noted that the design of this equalization of flow tank is based upon the holding of treated or aerated liquor rather than the holding of raw sewage which is relatively common as a method of equalization of the flow.

Return of Recirculation Liquor from the Race. The design of a Spiraflo settling tank is such that it is possible to provide a long flow distance and sufficiently low velocity in the race without passage through the center settling compartment. The design is such that adequate settling can be obtained for liquor to be used for recirculation purposes, and at the same time, a very material economy can be obtained.

Chemical Treatment of Sludge. The theory of this process is that once the solids are removed from the liquor (or settled out) the solids should be kept out and not permitted to return to solution. The effect of the addition of ferric chloride in an amount of about 2000 ppm is to produce a pH of about 3.5 with practical sterility. The housed, compartmented sand beds having about 800 sq. ft. are very attractive as to cost, the process is relatively odorless, very positive as to treatment, simple and trouble free—the disadvantage lies in the necessity to haul treated sludge twice weekly to disposal as fertilizer.

Special Design Features to Maintain Aerobic Conditions. The aerofilter type of distribution was included because of the aerating effect and use with tile media. Tile media was used because of the higher loadings permitted, the elimination of all anaerobic odor pockets and maintenance of a thin film from top to bottom of the filter with maximum aerobic flora activity.

Housing Boom

(Continued from page 82)

ple moved in without an alley they would complain to the Mayor and the Street Commissioner until we finally had to go out and fix the alleys. The "Round Robin" complaint system started. Several women

in the same block would start telephoning their complaints. One to the Mayor, one to the Street Department, and one to the City Engineer. After a short interval each would shift their attack to another official. When the first three finished three more would start. A person can quote laws, finances, manpower problems, etc., to each and every complainer but no official can stand several days of the "Round Robin". Finally in desperation the city forces would go out to straighten up the mess left by the builders.

Plugged Inlets

7) Many street inlets and catch basins were plugged with dirt and debris while the street was being built. A heavy rain after the purchasers moved in would flood the street from sidewalk to sidewalk. City forces would have to go out on emergency calls to open plugged drains. Some plugging was caused by dirt being washed off yards before the grass was planted. Our street department was forced to clean streets and gutters many more times in new additions than in the older parts of town.

8) Additions multiplied faster than our budget could be established. Street lights would have to be engineered, ordered, and installed; street name signs, garbage pickup, and all other facilities would be wanted immediately. Our finances and programs had to be reevaluated and reorganized, our manpower had to be spread out and pushed harder to accomplish more. Our costs increased and our income did not. The lag between assessment, taxation, and finally receipt of payment was and is too long.

How the Ordinance Helps

Our new ordinance can not solve all of the problems. It will solve the engineering problems. It will guarantee that the City will receive facilities that won't require immediate attention before they can be used.

The City Engineer's office was reorganized to operate more efficiently. Our complete staff consists of the City Engineer, two assistant city engineers and a secretary. They draw plans for all street, curb work, and sewer projects financed by escrow collections in the neighborhood, check all plans submitted for approval, supervise all construction of facilities.

Hammond has an area of 27 square miles and a street mileage of 300 miles. There are 182 miles of sewers. Our Engineering Department bud-

get is \$20,000. The population in 1940 was 70,000; in 1950 it was 88,000; and in 1952 it is estimated at 98,000. The Mayor is Vernon C. Anderson and the City Engineer is Robert L. Lippman.

Compressed Air

(Continued from page 71)

1) Pneumatic tools and other air operated equipment are extremely productive because of their light weight, controllability and adaptability to many kinds of work.

2) Maintenance cost of pneumatic equipment is reduced to the minimum because of rugged construction and few moving parts. Also, because tools stall rather than burn out when overloaded, there is no repair problem in that respect. The stalling characteristic also is an important safety factor on work such as drilling heavy planking because the danger from broken drills is eliminated.

3) No other form of power is so versatile in application or so easily and inexpensively applied to such a variety of work.

4) No other power is so portable, which is important in public work because so much of the activity is necessarily in the field. Also, the production ratio of gasoline or diesel engines—necessary for portable power—is far greater with compressed air.

Stretching the Budget

Virtually all public works use compressed air in one way or another. Budget-stretching suggestions have been made in respect to expanding those areas. There is, however, still another course in the same direction for municipalities which have not already taken it.

It is not at all uncommon for work crews to take air compressors and tools to the job with no thought of lubrication and routine maintenance; or to perform their work with dull tools, which greatly reduces productivity; or to hold equipment while at work on jobs which do not require an air compressor.

One city faced with this costly problem, solved it by establishing an equipment pool. One man moves from job to job in a light truck to keep equipment lubricated, replaces dull tools, checks air hoses for leaks and in other ways keeps the portable power plant and tools at peak efficiency. This practice reduces repairs and extends equipment life.

STREET CAR TRACKS: Tearing Them Up Is Easier Than Repaving the Holes

F. E. GRITZMACHER

KEEPING up with the modern trend, Wausau, Wisc., gave up its noisy and cumbersome street cars back in 1938, replacing them with buses. But the heavy steel rails remained, slippery in wet weather and a constant threat to safety. Then came World War II and the need for scrap steel. So the council passed an ordinance paving the way for ripping out the rails; but this didn't repave the streets. The rail had been set in 10 inches of concrete and when they were removed, the city found itself with an open trench some 12 ft. wide—for there were two tracks—right down the center of its main thoroughfare.

When it voted to remove the rails—performing a patriotic act and realizing a neat return on the sale of the scrap at the same time—the council anticipated that pavement replacement would be quick and simple. For some reason, however, the repaving went awry. Bituminous mixes seemed to kick out almost as soon as they were put down. The edges of the brick paving began to shove. In a little while holes as big as grandma's old-fashioned wash tub began to dot the street; and to get closer and closer together until it seemed that the street was just one big mass of deeply rutted holes over which trucks and cars bounced and jolted.

About this time a local movie flashed a newsreel of the shell-torn Burma road. Some wit promptly compared the trials of the Burma road truck drivers with the troubles of local and visiting motorists on the local main street. Soon Wausau became famous as the city with the Burma road main street. This didn't soothe the pride of the Wausauites and a clamor arose to do something about it. To appease the tide of public criticism, the city tried one remedy after another—crushed stone laid after the manner of waterbound macadam; rotten granite used widely in the area for rural roads; and asphalt mixes—all with no success. After two years of failure, the city fathers talked of cement concrete paving, but there were many underground improvements to be made. Larger water and gas mains, and larger sewers were



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needed; and iron pipe was on the wartime critical list and virtually unavailable.

About this time a new administration went into action, with a change in council committees. A young advertising executive headed the new Street & Alley Committee. He realized that, if Wausau was to have a solution, expert help was needed to show the street department how to build a street that would last. He called on Walter Kluever, the Street Commissioner, for information. The conversation went something like this:

"What, in your opinion, is the best binding agent to use in your bituminous mix?" The answer from the Street Superintendent came promptly: "Tarvia." "How much have you been using?" asked the Councilman. The prompt reply was "Practically none."

A consultation between Mayor Herbert Geise, City Engineer Archie Becher and Street Commissioner Kluever followed. It was decided to invite the Barrett Co. to send in their engineers to look at the problem and to lay down a formula for paving the street. If their recom-

mendations sounded feasible, enough material would be purchased to retread that portion of the brick pavement which could be salvaged and to build up the section torn up in the process of removing the nails from the street.

The recommendations of the engineers were discussed and adopted by the council. These recommendations called for building up the trench from which the street car rails had been torn with 6-inch layers of 3-inch crushed stone, water bound and rolled with a heavy roller. After rolling, the voids were filled with crusher dust, also water bound, and again rolled. To this a tack coat of RT-3 tar was applied. A bituminous surfacing of two courses, each 2 inches in compacted thickness, of hot-mix, using crushed stone, sand and RT-10 tar was laid over the entire width of the street—60 ft. In preparation for the surfacing, the brick was swept and a tack coat of RT-3 applied. Because the city had not yet purchased its Barber-Greene paver, these courses were spread with a grader. After final compaction, a surface coat, 1/2 inch thick was applied, using RT-10 and sand. The entire job was completed in three weeks, covering about 3,000 ft. of street or a total of 2,000 sq. yds. Total cost, including the final seal coat of RT-12 applied several weeks later, was \$8,500.

After twelve years of the hardest kind of service—for this street carries all of the traffic on Federal Highway 51 and State Highway 29—the pavement presents the same smooth and even surface that it did when it was first laid. The many excavations necessary to be made—for water, sewer and other utility repairs—have been patched and have held as smooth as the original paving; in fact, most of them are barely detectable.

The success of this pavement created a new enthusiasm for black top surfacings and for Tarvia in particular and many miles of such new construction have been laid. Today Wausau does not have to apologize, as it did twelve years ago, for the condition of its principal streets.

What If the Federal Gasoline Tax Were Abolished

Most highway organizations appear to be supporting the retention of the Federal gas tax, but with increased Federal aid for highways. If the tax were eliminated probably Federal aid and the Bureau of Public Roads would go too.

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APWA News

AMERICAN PUBLIC WORKS ASSOCIATION
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CHAPTER MEETING NEWS

Southern California Chapter

LOS ANGELES, CALIF.—About one hundred members and guests attended the annual meeting of the Southern California Chapter in Los Angeles, December 3rd. William M. Henderson was re-elected President of the Chapter for the 1954 term. J. F. Martinek, City Engineer of Whittier was named First Vice-President to succeed Milton H. Irvine, City Engineer of Riverside. J. R. Lester Boyle, Consulting Engineer, Santa Ana and Frank E. Randall, of Los Angeles were re-elected to their respective offices of 2nd Vice-President and Secretary-Treasurer of the Chapter. The entire Executive Committee was re-elected except for Ben R. Paris, Assistant General Superintendent, Bureau of Streets, Los Angeles who was elected to the Committee to fill the vacancy created by the election of J. F. Martinek as First Vice-President.

The dinner meeting was preceded by two informative discussions at the afternoon session. The first topic "The Catalyst VS Smog" was presented by Harold W. Story, Executive Secretary of the Los Angeles Pure Air Committee and George Ferdinand, Chief Engineer of Air Pollution Control, Inc. Many interesting problems encountered in controlling air pollution were discussed and the corrective measures and devices employed to relieve Los Angeles of the smog menace were explained.

The second topic discussed at the afternoon session was "Pitfalls and Precautions In Public Works Projects". James A. Nicklin, a Los Angeles attorney, gave a very informative talk which armed the engineers and contractors with some valuable operational tools to work with while engaged in public works projects.

APWA and USPHS Report on Refuse Collection and Disposal Practices for the Small Community

All Methods and Regulations
Outlined from Point of View
of the Small Community

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"A Taxpayer Looks at Public Works" was the topic of the excellent after-dinner speech presented by N. Bradford Trenham, General Manager of the California Taxpayers Association.

Chicago Metropolitan Chapter

CHICAGO, ILL.—Water supply problems of the Chicago Metropolitan region was the subject of an interesting talk delivered before the December 4th meeting of the Chicago Metropolitan Chapter by Louis R. Howson, well known consulting engineer of the Chicago firm of Alvord, Burdick & Howson. Some 150 members and guests attended the luncheon meeting held in down-town Chicago.

(Continued on page 90)

A JOINT study and report on "Refuse Collection and Disposal for the Small Community" has been prepared and published by the Public Health Service and the American Public Works Association. The abstract herewith of this publication shows the valuable information it contains. Copies of the report may be obtained from the American Public Works Association, 1313 East 60th St., Chicago 37, Illinois, for \$2.00.

Uniformity of terminology is necessary for maximum understanding by those working in the same field. The following definitions, based on those published in *Refuse Collection Practice*, American Public Works Association, 1941, are recommended. Throughout this article, these definitions will apply:

1. Refuse.—All putrescible and nonputrescible solid wastes, (except body wastes), including garbage, rubbish, ashes, street cleanings, dead animals, abandoned automobiles, and solid market and industrial wastes.

2. Garbage.—Putrescible animal and vegetable wastes resulting from the handling, preparation, cooking, and consumption of food.

3. Ashes.—The residue from the burning of wood, coal, coke, or other combustible materials.

4. Rubbish.—Nonputrescible solid wastes (excluding ashes), consisting of both combustible and non-combustible wastes, such as paper, cardboard, tin cans, yard clippings, wood, crockery, and similar materials.

Preparation—Premises storage is an important phase of the refuse program. Proper storage of refuse at the point of origin not only minimizes public health dangers, but aids in speeding up the collection (Continued on page 90)



● MEMBERS of the Southern California Chapter at their recent dinner meeting.

APWA Chapter News

(Continued from page 89)

According to Mr. Howson, the suburban water supply problem in the Chicago area is at least 30 to 40 years old. The source of water supply for the entire metropolitan area he said, will ultimately be Lake Michigan. When and how are the basic questions that must eventually be answered.

The present water problem, however, is not the problem of supply but the problem of transportation. The water business, he said, is the biggest business in the country. Chicago, for example, on an average day draws about four million tons of water from Lake Michigan and distributes it through its network of mains. About 8% of this is delivered to points outside of the city. In just one week this tonnage of water exceeds the tonnage of cargo handled by either the Panama or Suez Canal in a whole year.

It seems certain, he said, after discussing the water distribution problem, that the suburbs will demand and will get better water service when they realize that the difference in cost between adequate and mediocre water service is only about 1¢ per family per day.

Wyandotte Engineer Heads The Michigan Chapter

DETROIT, MICH.—Louis Moehr, City Engineer of Wyandotte, was elected President of the Michigan Chapter at its regular monthly meeting held December 17th, in Detroit. Moehr succeeds Morton Hilbert, Director of Engineering of the Wayne County Health Department as President of the Chapter. Other members elected to fill offices for the 1954 term are: E. L. Pettingill, City Engineer, Mt. Clemens, 1st Vice-President; Jan Schmedding, Supt. Street Construction and Maintenance, Detroit, 2nd Vice-President; Harold Huldquist, Supt. of Public Works, Livonia, 3rd Vice-President and J. B. Jewell, Supt. of Public Works, Pontiac, Secretary-Treasurer.

FILM OF THE MONTH

"Sanitary Landfill Up North" is the featured film of the month. It is a 16 mm. color sound film produced by the North Dakota State Department of Health. The running time of the film is 12 minutes. It shows the inauguration of sanitary landfill operations during winter conditions at Mandan and Bismarck, North Dakota. This movie illustrates how garbage and refuse can be buried properly even under conditions of considerable snow and rather low temperatures. The film may be borrowed through the Regional Office of the U. S. Public Health Service at Atlanta, Georgia, or Kansas City, Missouri or from the North Dakota State Department of Health. Copies of the film can also be purchased from Byron, Inc., 1226 Wisconsin Avenue, S. W. Washington, D. C.

APWA Report on Refuse

(Continued from page 89)

process, with consequently lower cost.

Decisions regarding preparation will be influenced by the type of equipment for collection, and by the method of disposal. Some limitations regarding size and weight of containers will be required. Rules should require the use of receptacles for all refuse so as to eliminate "piling" of material. Reasonable quantities of yard refuse (leaves, cut grass, and clippings) should be accepted for collection, if properly bundled or receptacled. Overweight containers, dangerous liquids, broken glass, or other material that poses a potential hazard to the collectors should be excluded.

Point of Collection — Curb and alley collections combine minimum time for collection with minimum cost for the service. Where better service and community appearance are the aim, consideration should be given to carry-out service.

Collection of Refuse

The collection system can be municipally operated, or the municipality can license one or more private firms or individuals to provide such services. Whether a system can be better operated by the municipality itself or contracted for by the municipality depends on local conditions. The costs outlined in the report are based on a non-profit system. A contractor would have to increase these charges enough to provide a profit.

Specific items which have to be determined are: (1) The number and size of collection vehicles required; the number of employees necessary to man these efficiently; the routes to be followed by the collection vehicles in order to provide a balanced schedule for the size of trucks, number of men, and hours of work; (2) the method of final disposal; and (3) the method of financing the system.

Equipment and personnel—The number and size of the collection vehicles are so closely dependent on the amount of refuse to be collected that these items should be considered together. Charts are included in the report which serve as a guide for determining these factors. These charts are based on time-and-motion studies conducted in a number of American communities, with two collections per week for residential areas; an 8-hour working day, and an average haul

of 2 to 4 miles to the disposal area.

Careful attention must be given to the routing of the collection vehicles, in order that the daily workloads will be balanced for all crews. Every attempt should be made to locate the disposal site or sites in proper relation to the areas to be served, maintaining a short haul wherever possible. A map indicating population densities and business areas will be found to be very useful.

Utilizing a 3-man crew (2 helpers and a driver) on compactor-type trucks, surveys have shown that 0.9 minute for each alley and curb pickup, and 1.7 minutes for each carry-out service are good average figures. A pickup point is defined as one storage area for one or more containers serving one dwelling. Such a dwelling might contain more than one family. In an area of large apartment houses, the average figure could be significantly altered. Past surveys show that there are approximately 5 persons per unit collection point or pickup; 8 percent of these points will yield an approximation of the number of business pickups. In business areas, 3.5 minutes per pickup is a good average. The number of minutes per pickup point includes non-productive time, such as that required for a normal haul going to and from the disposal area; time for refreshment, time for getting to and from the route in morning and evening, and other non-productive periods. These averages will be useful in initial planning of routes. By utilizing a property map of the community, and applying the representative minute-per-pickup figures to each occupied property, it will be reasonably possible to estimate daily routes. Chart 3 (with the report) shows the approximate number of residential and business pickups per given population.

Where a collection system is already in use, or where it is possible to run time studies, it is preferable to determine the actual minutes per unit-dwelling required by the collection crews under operating conditions. In any case, adjustment of routes by actual operating experience in the field will be necessary.

Disposal of Refuse

The method to be used for disposal should be determined by community characteristics and a careful study of local conditions. In small communities, the sanitary landfill method of disposal should be given first

(Continued on page 100)

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WRITE FOR LITERATURE



Washington



news

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Chairman Albert M. Cole of the President's Advisory Committee on Government Housing Policies and Programs has released the Committee's report. Included among the Committee's recommendations are a number of findings which have a direct bearing upon municipal public works.

Community Facilities, Public Law 139: The subcommittee on FHA-VA programs has recommended that the program for Federal assistance for essential facilities, primarily water and sewer projects, now authorized for defense impacted communities, be allowed to expire on June 30, 1954. The subcommittee was "of the opinion that any remaining defense-related needs for community facilities should be apparent at this time and should be accommodated prior to the scheduled expiration."

Overall Planning: The Committee recommended that special consideration be afforded municipalities which demonstrate the highest level of performance in an overall approach to the problem of urban decay. Included in the Committee's idea of an overall approach would be joint public and private action to rehabilitate and conserve neighborhoods through the use of public parks and cleared areas, better public facilities, new and "renewed dwellings." High on the Committee's suggestion list was the recommendation that accelerated safety and building code enforcement be initiated.

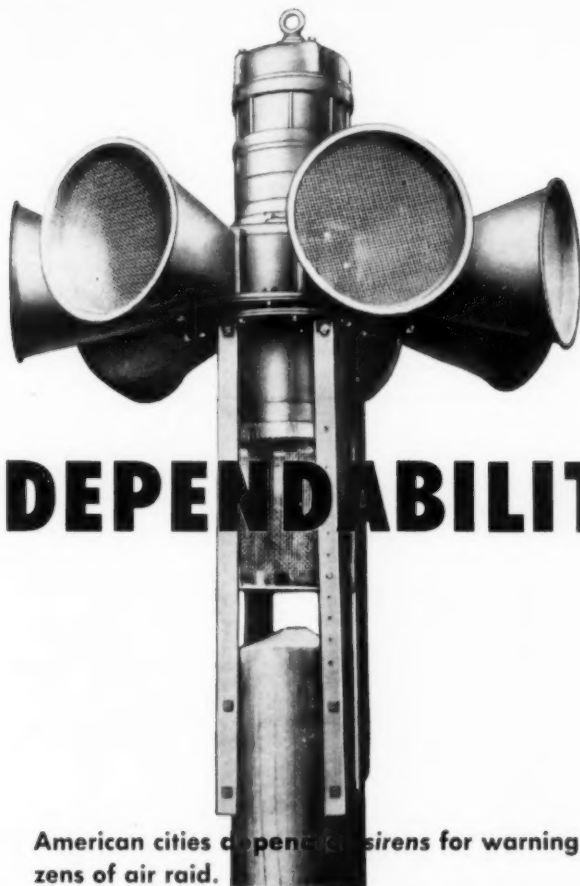
Funding Requirements: Recognizing that municipal governments do not have the fiscal ability to underwrite adequate programs, the Committee recommends that Federal financial support be continued. Particularly, more funds would be allocated for metropolitan planning and for "testing and developing slum prevention and elimination techniques".

Urban Renewal: The subcommittee on Urban Redevelopment has recommended that an Urban Renewal Administration be established, similar in status to the PHA and FHA. It is also recommended that within the proposed agency there be created an Urban Renewal Service which would provide technical and professional assistance in planning and organizing programs for urban renewal. The agency would also develop experience data based on work in cities which would afford a basis for budgetary planning. The data collected would also provide a basis for a "speed-up" slum clearance program in the event of recession "while achieving immensely constructive results throughout our cities".

Correlation with Defense Requirements: The Committee recommended that future renewal and clearance projects be planned so that the layout of parks, playgrounds, and other open land, will constitute effective firebreaks in the event of major conflagrations due to enemy action. To this end, the Committee recommends that Federal housing agencies maintain a close liaison with Federal defense agencies so that defense needs can be reflected in the technical assistance provided to municipalities.

Thinking On Public Works

The Assistant to the President, Sherman Adams, in an address before the American Municipal Association Congress at New Orleans on December 2, 1953, voiced Administration thinking concerning Federal relationships with states and cities in maintaining an adequate level of public works construction. Said Adams: "The major responsibility for providing highways, schools, hospitals, sewer and water facilities and the like, has always rested with state and local governments. Although the Federal



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government has a large military program under way, the volume of construction work initiated by state and local government is about twice as large as the work being done for the Federal government. State and local governments are fully aware of the benefits to be derived from expanding their construction activities. It is gratifying that they are giving increased attention to developing plans for public projects that could be gotten underway if private employment began declining significantly.

"Let me say . . . that . . . the Federal government is working closely

with you in the development of the plans for many of these projects.

"Should the Congress decide that an accelerated public works program is desirable, authorize such a program, and provide the funds, the Administration will be in a position to move fairly rapidly. . . . We are not taking any chances and we are not going to trust to hasty improvisations, such as have ruled past practices."

Federal Gasoline Tax

As the Second Session of the 83rd Congress convenes, signs indicate that the Federal gasoline tax will

not be abandoned despite the efforts of the proponents of return of the tax to the states. Representative J. Harry McGregor (R-Ohio), Chairman of the House Subcommittee on Roads, stated before the U. S. Chamber of Commerce National Conference on Highway Financing that he definitely does not believe the Congress would appeal the tax, nor would Congress allow the tax to drop to 1½¢ per gallon on April 1, 1954, as now scheduled. McGregor did warn that should the Congress be forced to drop the tax, the Bureau of Public Roads would be a sure fatality.

So far, only two states, Kansas and New Hampshire have provided by legislation for a state levy of an additional gasoline tax should the Federal tax be abandoned. As time goes on, it becomes increasingly clear that many states would face a severe legislative battle if additional gas taxes were recommended.

• • •

Reversible Lanes to Speed Traffic Flow

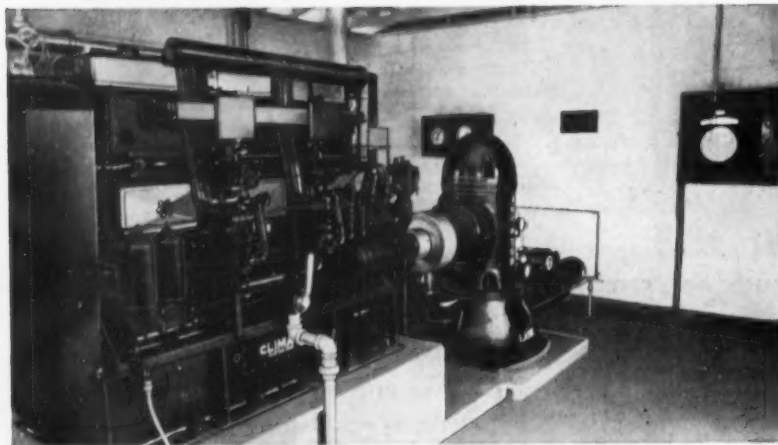
Traffic control apparatus reported to be unique in this country has been put into operation in Cincinnati. It is designed to make use of the center lane on the Columbian Parkway for either direction of traffic during rush hours. Spaced about 400 feet apart are 22 signal units to control traffic flow on the reversible lanes. Signs explain that the lane is to be used only on the green light. Cost of the project is reported to be \$32,000. The outer drive in Chicago has a similar type control measure using reversible traffic lanes created by movable barriers.

• • •

Paving, Sewer and Water Assessments Raised

A NEW special assessment rate schedule has been approved tentatively by the board of revisions of assessments in Cleveland, O. The new schedule would raise the assessments for paving, sewer and water mains for prospective home builders. Under the present schedule which went into effect in 1950, property owners pay \$9 a front foot for paving, \$7 for sewer installations and \$3.50 a front foot for water mains. The new schedule will boost paving assessments to \$12 a front foot, sewers to \$8 and water mains to \$4.50. These new figures are based on actual cost experience by the city.

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PUBLIC WORKS DIGESTS

THE WATER WORKS DIGEST

Water Conservation By Industrial Users

Industries in this country use nearly five times as much water as domestic users and, in some areas, its use has exceeded the amount readily available for all purposes. In some locations, difficulties have been experienced by "heat pollution" of streams caused by successive reuse of water by industry. Industrial uses, estimated at 80 billion gpd in 1950, are expected to grow to 215 bgd by 1975. Conservation of water by industries is therefore becoming increasingly necessary. Methods of accomplishing this the authors classify under five heads: Using less water; using water over again in the same process; using water from one process for one or more additional processes in the same establishment; using water from another establishment, or using non-potable water; and using special methods to reduce the amount of cooling water. Illustrations of each of these are given. If water-works men are to help meet this problem, they will not only need greater skill and alertness but will also have to arrange for increasing cooperation with industry.

"Water Conservation in Industry." A Task Group report. *Journal*, AWWA, December.

New ASA

Cast-Iron Pipe Standards

The history of the Am. Standards Ass'n specifications A21, with the modifications, and discussions of their various provisions are contained in a panel discussion—"Cast-Iron Pipe Tests" by J. Thompson Vann; "Manufacturing Considerations" by H. W. Stuart; "Consulting Engineer's Viewpoint" by Louis R. Howson; and "Manager's Appraisal" by Wendell R. La Due. Discussing the 1953 specifications for cement lining, Mr. Stuart said that pipe manufacturers now are required to use Type II cement instead of Type I; a more definite grading of sand size; a definite frequency of testing

the sand and cement and the finished lining; and recording of these test results. Mr. Howson commented that the new specifications do not cover any lining other than cement mortar. Mr. La Due thought it would be worth while for a task group to investigate the question of pipe bells and spigots, covering dimensions of sockets, spigot beads, proper joint space for lead, lead substitutes and cement mortar; profile of outside of bell; use of Class D fittings with Class B pipe larger than 12-in.; and development of good-practice standards for harnesses to be used on pipe layouts involving bends.

"Now ASA Standards for Cast-Iron Pipe." *Journal*, AWWA, December.

Financing Extensions Of Distribution System

The village of Lombard, Ill., 10,000 population, supplies water to the residents of several adjacent subdivisions, who are charged twice the rates paid by residents of the village. Extensions of the system by new construction have been financed by charging village residents some percentage of the previous year's bill and requiring its payment as part of the present and future bills. This payment is considered a portion of the regular bill, subject to the same penalties as the regular bill in case of default. Residents of the subdivisions pay \$50 per lot toward future extensions. The money accumulated in this manner established a village construction fund and eliminates financing for needed extensions or improvements.

"Village of Lombard's Major Business is Water Supply." By John I. T. Moloney. *Water Works Engineering*, November.

Attractive Appearance of Allentown's New Filters

Allentown, Pa., in August 1953 dedicated a new 20 mgd filtration plant, to provide for increased consumption. The plant is near the center of the city and convenient

for visitors, and special attention was paid to making it attractive in appearance. The eight rapid sand filters have colored tiled walls, porcelain-block filter bottoms and submerged lights. The interior of the filter room is so decorated as to carry out the general color scheme. The tiling is generally light colored, with dark tile occasionally for decorative effect. Ceiling lights are recessed. The floor is terrazo. A lighted sight well at the entrance of the filter room demonstrates the clearness of the water, through which can be read the data on a silver dollar embedded in the bottom of the well. In a brightly painted foyer are exhibits describing the history of the water works and the operation of the purification plant.

"Allentown, Pa., Is Proud of Its New 25 MGD Filter Plant," *Water Works Engineering*, December.

Purchase and Use of Lime

All limestone contains impurities, of which silica, iron oxide and alumina are the most common. Limestone containing less than 10% magnesium carbonate is considered to be high-calcium. From an economical standpoint, delivered price, available basicity, and reactivity are of fundamental importance. For neutralizing acidity, what is really paid for is available basicity; inert material is worse than valueless. The only sound way to determine available basicity is to measure it under conditions simulating those of actual use. The author describes how this can be done easily and quickly in the laboratory. Wide ranges of reactivity are due to composition and structure of the limestone, plus calcination practice. The more reactive the lime, the smaller the plant needed to treat a given volume of liquid and the lower the operating cost. Reactivity can be estimated roughly by observing the settling rate of a lime suspension. The most reactive limes are those that yield the finest particles when they are

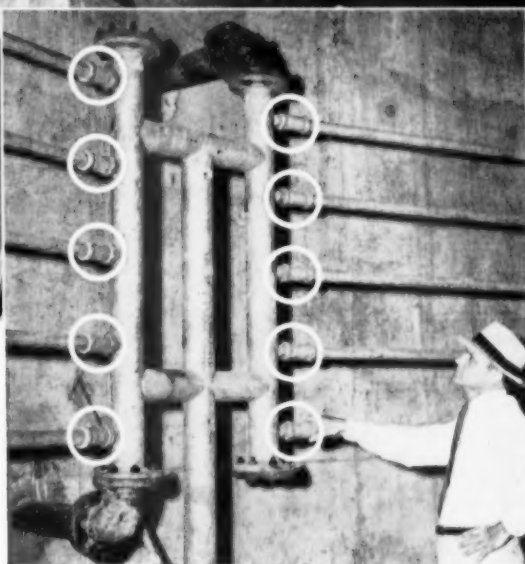


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hydrated. Improper slaking causes diminished reactivity.

"How to Buy and Use Lime as a Neutralizing Agent." By Richard D. Hoak, Mellon Institute. *Water & Sewage Works*, December.

Water Distribution In Fairbanks, Alaska

In Alaska, where the temperature has reached -66° and no frost-free depth of soil is available in which to lay water mains, ordinary distribution systems are impracticable. For a system constructed recently in Fairbanks, the single main recirculating system was adopted. This is entirely dependent upon circulation to prevent freezing of mains and service connections, and the pumping must be operated without interruption throughout the winter, to maintain a velocity of at least 3 ft. per second. The water is heated as it passes through the

pumping station, the amount of heat to be supplied being equal to that lost in the mains and service connections during its passage through the distribution system from and back to the station. The heat is supplied by the normally wasted condenser cooling water from the City's steam generating plant. The amount of heat required was calculated on the basis of ground temperatures and the thermal conductivity of the soil.

"How a Water Supply Was Designed for a Permafrost Area." *Public Works*, January.

Increases in Costs and Revenues

The authors have made a statistical analysis of waterworks data collected from 416 utilities relative to their conditions in 1950 and have compared them with similar data for the year 1945. This comparison

showed that, during that five-year period, revenues increased \$36 per million gallons, a 24% rise. Expenses increased \$37 per million gallons, a 40% increase. On a per capita basis, revenue increased 34% and operation and maintenance cost 45%. To keep step with the reported general cost index rise, the revenue should have increased at least \$67 instead of the \$36 per million gallons actually obtained. In 1950, of 416 cities reporting, 111 reported no treatment and 120 reported filtration only. The remaining 185 reported various other types and combinations; softening by 73 cities. Surface supplies exclusively were used by 53% of the cities reporting, and ground water exclusively by 28%; 14% employed a combination and 5% purchased all their water. Analysis of all the figures are presented in 30 tables.

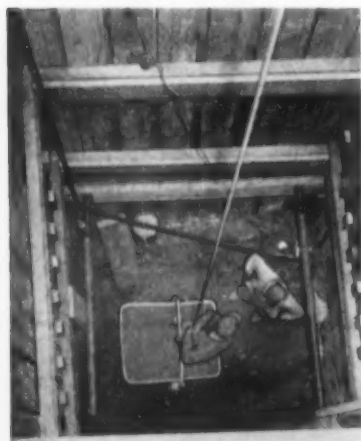
"A Statistical Analysis of Water Works Data for 1950." By Harris F. Seidel, A. Stanford Johnson and Donald O. Dencker. *Journal of AWWA*, December.

Digging a Tunnel for 30-ft. Deep Vitrified Clay Sewer

IN connection with construction of a relief sewer in Wichita, Kansas, it was necessary to lay about 1060 ft. of 15-in. vitrified clay sewer at a depth of 30 to 33 ft. Ground conditions were not considered good for trenching at this depth; moreover, the section was completely residential and fully developed and deep trench work would have been unwelcome to the residents. It was therefore decided to tunnel. Shafts 10 ft. by 12 ft. were dug at intervals of 100 to 200 ft., and tunnels were cut between the shafts, using pneumatic clay spades. The tunnel section was $3\frac{1}{2}$ ft. wide and 5 ft. high. The pipe was blocked off the floor

on low cradles, the joints made with a hot-poured material, and the entire tunnel filled with concrete.

For safety, the shafts were sheeted solidly with 3 by 12-inch planks, fully braced. The interior of the tunnel was also lined with 3 by 12-inch material, the lining following closely the face of the tunnel. Lights were provided and the work carried on in two 9-hour shifts. Only a small amount of dirt had to be removed, keeping the streets clean. This job was a portion of a project which involved about 4.8 miles of vitrified clay pipe construction. The contractor was the W. B. Carter Construction Co.



● TOP view, showing timbering of shaft and crane bucket.



● SEWER completed, ready for final filling with concrete.

Density Currents and Reservoir Temperature and Silting

Phenomena connected with density currents have been studied by hydraulics specialists of the Tennessee Valley Authority, using the Authority's 30 reservoirs as a full-scale laboratory. Cold water entering warmer water in a reservoir or lake flows along the bottom to the outlet, often at a rate much greater than the average for the total body of water. In one reservoir it traveled 49 miles in 19 days (0.16 ft. per sec.), none of it on the surface, which affected the amount of self-purification during its passage through the reservoir. Density currents also affect the amount of silt carried to and deposited behind dams. A warm stream entering a cold body of water flows in a stratum on the surface; thus the temperature of water withdrawn from a reservoir can be controlled by a knowledge of its density currents. Cold under-currents can cause a back-flow of surface water, and has been known to cause sewage effluents to flow up-stream to the intake of a waterworks presumably located a safe distance above it.

"How Density Currents Affect Water Controllers, Water Users." *Engineering News-Record*, Dec. 17.

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OTHER ARTICLES

"Sources of Supply: Impounding Reservoirs. (7th of a series)." By George E. Symons. *Water & Sewage Works*, December.

"Increasing Well Yields with Calgon Treatment." By Louis R. Caplan, Parr Eng. Co. Water & Sewage Works, December.

"Does Erection of Water Tank Justify Suit by Neighbors?" (Yes, in North Carolina). **Water Works Engineering**, December.

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Factors to Consider in Media Quality Control for Trickling Filters

MANY Illinois municipalities and institutions have had trying experiences with the rock placed in their trickling filters, says the "Digester", publication of Illinois' Sanitary Engineering Division. The important items to be considered so far as the rock is concerned are the size of the individual pieces; the elimination of fines or dust and chips; the soundness of the stone or its resistance to disintegration when subjected to severe weather changes; and the method of placing the rock in the filter. Briefly, standard rate filter media should have the following characteristics: The pieces should be retained on a screen having 2-inch square openings and should pass through a screen having 3½-inch square openings; it should be free from dust, clay, sand or fine material; it should be resistant to spalling or flaking as shown by withstanding a sodium sulfate soundness test; and it should be placed in the filter in a manner that will prevent breaking the underdrain system and will minimize abrasion or breaking of the stone. Unless this is accomplished the filter will be subject to ponding and inefficient operation. In addition the fines that are washed through may cause stoppage and excessive wear in the secondary sludge handling equipment as well as in the digester.

The requirements for control of the quality of filter media stated in the "Rules and Regulations Governing the Submission of Plan Documents and the Design of Sewage Works" as adopted by the Illinois Sanitary Water Board in 1951 are intended to insure the procurement and proper placing of serviceable material. In addition, the following requirements are in force:

In order that trickling filter media will be in substantial compliance with quality requirements set forth in par. 71.161 and 71.162 on Page 40

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of "Rules and Regulations Governing the Submission of Plan Documents and the Design of Sewage Works," adopted by the Illinois Sanitary Water Board on December 19, 1951, consulting engineers shall be requested to require the following procedure to be used as the basis for judging the acceptability of the media provided by the contractor.

1. Filter media shall be tested by a competent materials testing laboratory using the procedure outlined in "Manual of Engineering Practice No. 13," published by the

American Society of Civil Engineers.

2. Sample for testing shall be taken in a manner which will insure that it represents accurately the media placed in the filter. It shall be collected by an experienced employee of the testing laboratory or by a representative of the owner, and preferably in the presence of a representative of the contractor and the consulting engineer. Results of tests on samples collected by persons in the employ of the quarry operator or the contractor will not be accepted.

3. Acceptance of the filter media

by the owner shall be based on the results of a test, or tests, made on samples collected at the job site. A duplicate copy of the test results shall be made available to the owner for filing with the Illinois Sanitary Water Board. Tests of filter media stockpiled at the quarry may not be substituted for a test on delivered media, but the contractor at his own expense may have such tests made as he desires to insure delivery of satisfactory media to the job site.

It is one thing of course to have adequate specifications on a job and quite another to have them adhered to. All municipal officials and other responsible persons involved in the construction of new filters should provide for detailed inspection of construction by the designing engineer. It is then the engineer's duty to ascertain that the plans and specifications are fully followed.

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APWA Report on Refuse

(Continued from page 90)

consideration because it often offers the best means of complete sanitary disposal of refuse at the least cost to the small community. However, where local circumstances are unfavorable, as may be the case in suburban areas, consideration should be given to incineration of all refuse, or a combination of rubbish incineration and garbage-grinding or other methods.

Sanitary Landfill—In a sanitary landfill, which requires the prompt covering of the refuse with sufficient earth to prevent health hazards, the refuse must be compacted into the smallest practicable volume by a crawler-type tractor or other compaction machine. There are three methods in general use today:

A. The trench method, in which cover material is obtained by excavating a trench; the refuse is then dumped into the trench and compacted and covered with earth obtained by excavating an adjacent trench.

B. The progressive-slope method, an adaptation of the trench method; instead of digging a trench, cover material is obtained from the area just ahead of the working face of the landfill.

C. The area method, in which no trench is excavated; cover either is hauled in or is obtained from areas immediately adjacent to the work site. Usually, this method is utilized when the soil conditions in front of



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and crawler tractors

the face of the fill do not permit tractor operations, as in swampy areas.

The trench, progressive slope and area methods of operating sanitary landfills are illustrated in detail by sketches and drawings occupying several pages in the report.

Current practices in the operation of landfills vary according to size of community, condition of site, and equipment available. The following general principles apply:

1. Disposal of refuse by the landfill method should be planned as an engineering project. If an experi-

enced person is not available locally, assistance can be obtained from the State health department.

2. Landfills should be so located that seepage from them will not cause hazards or nuisances.

3. The face of the working fill should be kept as narrow as is consistent with proper operation of trucks and equipment, in order that the area of refuse exposed will be minimized.

4. The exposed surface of the refuse should be covered with earth as promptly as proper operations will permit, and both the surface and the

face should be covered daily on full-time operations.

5. The final covering for surface and side slopes should be approximately 24 inches.

6. Adequate surface drainage should be provided to prevent ponding and/or erosion by rain water, usually accomplished by sloping the final cover slightly.

7. Refuse should be compacted into cells or lifts not exceeding 6 feet in depth. The procedure should provide for compaction in layers of loose refuse about 2 ft. thick.

8. Consistently good operation may obviate the need for any insect and/or rodent control. Blowing paper may be controlled by poultry-wire or snow fences; and specific fire control arrangements should be made.

9. Scavenging is not recommended, but should be rigidly controlled if permitted.

10. For bad weather operation, an alternate operating area may be desirable.

Recent demonstrations have shown that light crawler-type tractors will provide reasonable compaction, and can supply adequate material from stockpiles to cover refuse dumped in a previously excavated trench. Many communities in the under-10,000 population group may find it feasible to utilize this equipment. In some soils, excavation of trenches may be uneconomical with such light equipment; in such cases trenches can be excavated in advance by rented or loaned heavy equipment. A chart showing the monthly trench capacity required is included in the report. The use of such light equipment for compaction requires also that selective dumping be practiced; large hard-to-handle objects should be placed in a separated area.

Other Methods

Incineration, garbage grinding and disposal by feeding to hogs are discussed in the report. It is pointed out that the use of grinders does not eliminate the need for collection, but may reduce the frequency. Feeding of the garbage brings up the matter of disposal of the unconsumed portion, maintenance of the feeding area and the matter of swine diseases. Cooking of garbage is discussed briefly. Composting is not considered applicable to the small community.

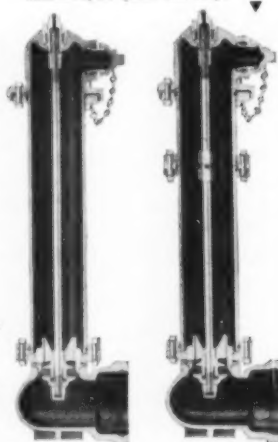
Salvage—Materials, such as rags, paper, cardboard, and metal, are usually present in household refuse. The market values for such materials



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vary considerably and, as a long-range plan, salvage is not suitable for the small community. In some cases, collectors are permitted to salvage such articles and materials as they proceed about their work, and to dispose of the salvage materials to local dealers. Also, hand-picking by scavengers at the disposal point (either incinerator or sanitary fill), has been practiced. This is not desirable, in the interest of sanitation and "good housekeeping." If permitted, strict control must be exercised to prevent it from becoming a nuisance.

Financing—The financing of the collection and disposal system should be considered a community-wide responsibility. Sufficient funds should be allotted to operate the system and to depreciate plant and equipment properly. In the past, this has been accomplished largely by the appropriations from general tax revenues. In recent years, the fee system has increased in popularity.

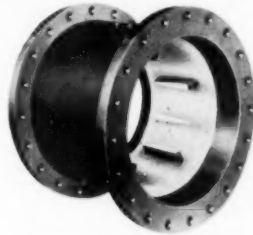
A chart is included in the report which presents an estimate of the total monthly cost of collection and disposal in communities large enough to utilize from one to four collection vehicles for full-time operation.

The Fee Method—Where fees for services rendered are billed to the individual separately from general taxes, a common method of collection is to include the refuse collection cost on the water or tax bill. This simplifies bookkeeping and clerical work, and cuts administrative costs. Flat fees on a monthly basis are preferred to those based on number of cans or volumes of refuse produced and collected—especially for business places. Payments in advance are desirable.

In these days of higher tax rates—some at the maximum legal limits—the fee system often permits the improvement or establishment of a system for refuse collection and disposal which, otherwise, would be difficult or impossible to accomplish.

Appendix—In the appendix are included (A) references; (B) a selected bibliography which will be found most valuable to those faced with refuse disposal problems; (C) a test solution worked out for a town of 2,000 population; (D) a long-form ordinance governing refuse storage, collection and disposal; (E) a short-form ordinance covering the same; and (F) suggested regulations for the storage, collection and disposal of refuse. These are based on the point of view and the problems of the small community and will be found most helpful.

Flow Tubes — For Accuracy in Metering



The Flow Tube is an impact-type head meter designed for accurate measurement and regulation of fluid flow. It consists, essentially, of a short spool piece, the inner periphery of which is equipped with two groups of pressure nozzles, one group pointing upstream and the other downstream. The nozzle groups are inter-connected by common pressure rings from which connections are made to the high and low pressure sides respectively, of a conventional indicating, recording or integrating meter.

Flow Tubes differ from other variable head meters in that the taps are located at points of equal cross-sectional area. Therefore, the differential developed is a function of the velocity head and independent of the static head.

Flow Tubes are compact, comparatively light weight, relatively low in cost, and are easy to install since they require straight runs entering and following only when installed near throttling valves or regulators. And, Flow Tubes are available in types and D/d ratios to provide differentials that can be accurately measured with the least head loss.

Flow Tubes are furnished with head capacity curves based on laboratory tests. These data furnished with each Flow Tube makes our guarantee of exceptional metering accuracy possible.

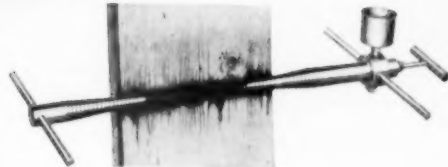
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PUBLIC WORKS DIGESTS

THE HIGHWAY AND AIRPORT DIGEST

Adapting Old Roads to Present Traffic

Financial limitations make it impossible in many cases to build new roads to meet the demands of increasing traffic, and it is necessary instead to improve the old ones. Equipment and methods for accomplishing this have been developed by experience, and the author, in a comprehensive article, describes these in detail. He discusses minor relocation; strengthening support for rigid pavements by Mud-Jacking and under-sealing, including use of hot asphalt; also strengthening support for flexible pavements. Widening operations are described in detail. Methods of improving surfaces of old pavements with bituminous and cement concrete are described, with special attention to the joints. In each case the equipment and materials found most satisfactory for the purpose, and the methods of using them, are described.

"How to Make Old Roads Fit for Today's Traffic." By George E. Martin. *PUBLIC WORKS*, January.

Aids by State To Urban Widening

In Minnesota, a municipality may enter into an agreement with the commissioner of highways for the construction and maintenance of a roadway or structure of greater width or capacity than necessary to accommodate the normal trunk highway traffic upon any trunk highway within its boundaries. The state pays 75% and the municipality 25% of the cost of surfacing the extra width. The cost of storm sewers for surface drainage of the highway and also for serving the municipality is shared by state and municipality in proportion to the ratio of trunk highway area drained to the total area drained. Where the trunk highway traffic requires two or more traffic lanes, the state

pays 100% of the cost of a middle width of 22 to 48 ft., depending upon the required trunk highway lane width and type of surfacing; also 100% of the cost of any center islands. The cost of moving municipally owned utilities is shared on the 75%-25% basis.

"How Minnesota Aids in Urban Widening." By O. L. Kipp, Ass't. Com'r. *Roads and Streets*, December.

Stabilization Trenches In Unstable Areas in California

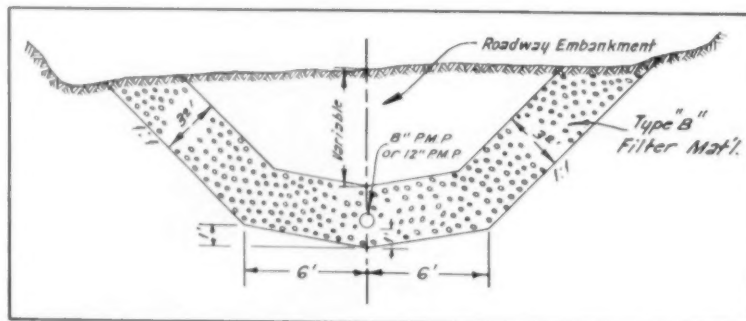
The California Division of Highways is developing 4.1 miles of the Redwood Highway to a four-lane expressway, involving a complete realignment through an area characterized by landslides and old fault lines which have resulted in numerous springs and unstable areas. Test borings indicate plastic clay layers extending to depths up to 100 ft. To provide corrective treatment of unstable areas, there are incorporated in the plans stabilization trenches, channel stripping and embankment foundation stripping. Stabilization trenches are constructed where unstable fill foundations are well defined, usually in swales or ravines. These trenches are 12 ft. in bottom width, have 1:1 slide slopes, and are excavated to depths varying from 5 to 25 ft.

Where excavation to a firm bottom would be prohibitive in cost, "floating" trenches are constructed. The trenches are generally constructed normal to the highway. The bottom and side slopes are blanketed with filter material 3 ft. thick, and the remaining part of the trench is backfilled with roadway embankment. Perforated metal pipe 8 in. or 12 in. in diameter is placed in the filter material one foot above the bottom of the trench. The filter material is compacted with vibratory tampers, except on the side slopes, as it is impracticable to compact this granular material and keep it in place on a 1:1 slope. These trenches are very effective in providing an outlet for seepage or subsurface waters and for dehydrating the surrounding ground and have proved very successful for fill stabilization.

"Ridgewood Project Challenges Engineers." By E. L. Blomquist, District Constr. Engineer. *California Highways and Public Works*, November-December.

Shopping Center has 7,500 Car Spaces

A new shopping center on the outskirts of Detroit built by the J. L. Hudson Company has many unique features: 162 acres of a 409 acre plot are being used now and 70 acres



Courtesy California Highways & Public Works

● STABILIZATION trenches designed for unstable areas.



"This No. 112 makes my work a cinch"

Frank F. Porock, Operator



TRINITY COUNTY, CALIFORNIA, has 674 miles of road to maintain, and the big job is handled—100 per cent—by Caterpillar equipment. The county has nine Cat® Motor Graders, seven D6 Tractors and one D7.

The Road Commissioner, Melvin E. Dale, reports: "For the tough all-round jobs we put it on, Cat equipment can't be beat. We don't have to worry about down time with these machines."

The No. 112 Motor Grader, shown smoothing a bad spot in the road before spreading oil mix, is also used for general maintenance, scarifying and snow removal—a big winter job here in the mountains.

Operator Frank F. Porock says: "This new No. 112 with large front tires and booster steering makes my job a cinch. I can get twice as much work done with less effort on my part."

The No. 112 is Caterpillar-built from end to end. Power, weight and speed are *balanced* for top production and easy handling. The operator can see his job from the driver's seat. No standing up—no

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have been set aside as a parking and planted area. The basement area of the buildings covers 15 acres.

Commercial traffic passes over a truck access road and down a ramp into the basement without crossing pedestrian shopping paths. Paving and planting were done in the initial stages of the construction program so that work could be carried on without having to contend with spring rains and mud.

All buildings are to be surrounded on all sides by 14-ft. covered walkways connecting all areas. Highways on the perimeter of the area have been widened and revamped.

"Shopping Center has 7,500 Car Spaces." *Engineering News-Record*, Dec. 17.

Mass Transportation— Can We Afford It?

The problem is divided into two parts by the author. (1) Do we have sufficient manpower and materials to meet the highway, street, airport and railroad deficiencies without harming other phases of the economy; and (2) can we raise the money without imposing too great a burden on the taxpayer.

Based on our war-time experience and an increase of 50 percent in pro-

ductive capacity since, the answer to the first question is "yes."

The money question is more difficult but the author believes it can be solved by using all the money collected from motor-vehicle owners to meet the deficiencies so far as streets and highways are concerned.

"Mass Transportation—Can We Afford It?" By Marcus Nadler. *Civil Engineering*, December.

Airfield Construction Outlook for 1954

The Federal-aid civil airport program probably faces another lean year but military airbase contracts should keep coming up at the current rate or better. The decision to increase the Air Force and to place main defense reliance on it indicates necessity for further airbase construction. Only the amount of money needed remains to be determined.

Last year Congress agreed to suspend additional contract authority for Federal-aid airport projects until the Commerce Department restudied the whole problem. This study is not complete and Congress will be asked to hold off again. However, the cities want even meager aid and say this often makes con-

struction possible. A review of 1951, 1952 and 1953 airport construction statistics is included in the article.

"Airfield Construction Outlook." *Engineering News-Record*, Dec. 31.

Using a Roughometer Survey of Highways

Arizona Highway Department has used an instrument to record the roughness of the 3500 mile highway system. The machine, borrowed from the Bureau of Public Roads, is a single wheel which records roughness in increments so that the roughness can be recorded in inches per mile or other convenient unit of length. Two men operated the machine and could log from 100 to 200 miles per day.

The information will be used to locate critical sections requiring immediate attention; increase competitive spirit for better construction between contractors; compare different construction methods; study effect of age, traffic and climate on road roughness; and determine effect of overweight trucks; and changes in roughness over the years.

"Six Uses for a Roughometer Survey." By Dean Smith. *PUBLIC WORKS*, January.

(More on page 108)

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- Independent wheel control for straighter line trenching and turning corners.
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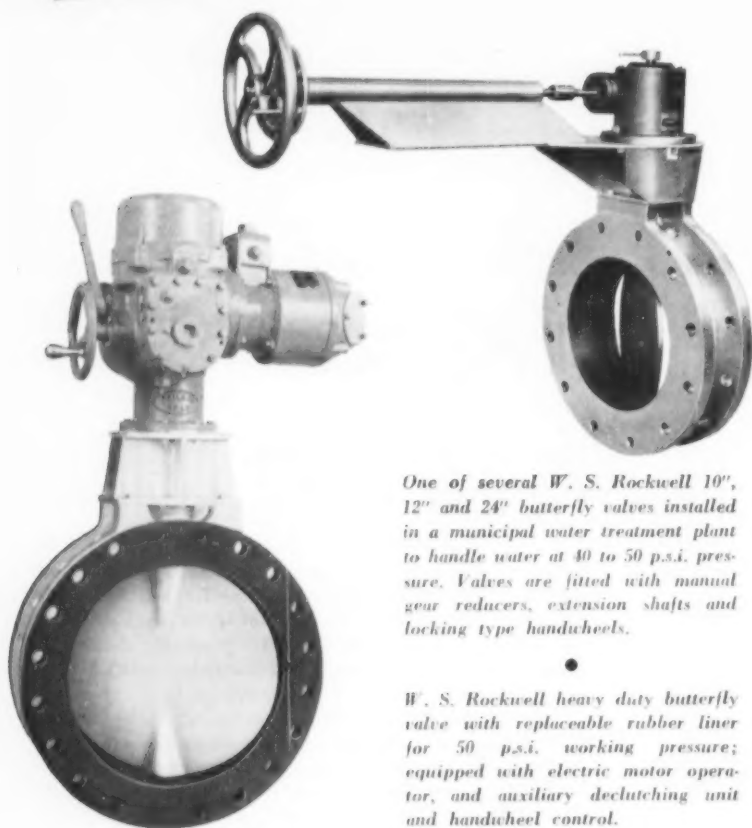
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OTHER ARTICLES

Spraying rubberized bitumen: instructions for doing it; by A. R. Smee, of the British Rubber Development Board. "Rubber in Roads", Contractors Record (England), Nov. 4.

Resurfacing concrete pavements with asphaltic concrete in Wisconsin. "Restoring the Serviceability of Concrete Pavements." By M. W. Fisher, Maint. Engr. PUBLIC WORKS, December.

Street sweeping in Hammond, Ind. is greatly speeded up by making cars park on alternating sides of streets. "Hammond's Special Parking Plan Speeds Up Street Sweeping." PUBLIC WORKS, December.

Street cleaning requires good equipment and public cooperation. "4 Musts for Better Street Cleaning." By Lem D. Merrill, Supt. of Streets, Birmingham, Ala. PUBLIC WORKS, January.

"Trends in Traffic Volumes, Vehicle Types, and Weights." By Thomas B. Dimmick, Bureau of Pub. Rds. Public Roads, December.

Parking in Cities. "Influence of Population, Sales and Employment on Parking." By S. T. Hitchcock, B.P.R. Public Roads, December.

Cooperation of Cities With Other Agencies. "How Cities Must Cooperate With Other Agencies." Roads and Streets, December.

"Tunnel Illumination." New ideas in the Gaviota Gorge project, Calif. By Roy Matthews, Sr. Elect. Engr. California Highways & Public Works, November-December.

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Up Front for Adequate Roads

(Continued from page 18)

telling about some interesting things which you encounter in your work, your approach to an unusual problem, or something similar? It's really not hard to do and what's more, editors usually pay good money for acceptable material. Previously, we have urged you in these columns to make every effort to attend one or more of the national or local meetings in the highway field every year. You'll find that you will get a lot from exchanging ideas with other people at these get-togethers; this is particularly true of the highway conferences held in many states in the spring of the year, most frequently under the auspices of the state college or university. By the way, if you need any help in convincing the boss that he ought to pay your expenses to one of these meetings, let us know and we'll try to help out.

Financing, Financing, Financing—The problem of financing the nation's highway and street improvement program continues to receive major

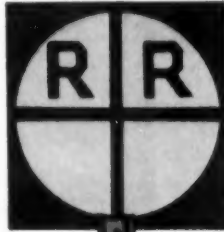
attention in many sections of the country. Legislative action is scheduled in many states with rough going, as usual, predicted for many financing proposals. In Kentucky, the state Good Roads Federation has put forward a proposal for bond financing of \$162 million worth of improvements on primary highways. An interesting angle is the way in which the proposed scheme would circumvent Kentucky's constitutional debt limit of \$500 million. Under the plan, an authority would be created which would issue revenue bonds, improve the roads with the money, then lease the roads back to the State Highway Department for sufficient rentals to service the bonds. In New York, Governor Dewey is expected to ask the state legislature to adopt a \$2.8 billion-dollar program of highway improvement backed with a 2-cent increase in the gasoline tax, which is presently 4 cents per gallon. Meanwhile, Charles L. Dearing, Deputy Undersecretary of Commerce for Transportation, told the national conference on highway financing (held in Washington in December) that it is quite possible that by 1963 tolls would be collected on 12,000 miles of the interstate system of (primary) highways. At the same meeting, J. H. McGregor of Ohio, Chairman of the House Public Works Subcommittee on Roads, warned that the repeal of the federal motor tax on fuels would result in abolition of the federal-aid highway program. Congressman McGregor did, however, predict that federal excise taxes on motor vehicle equipment and parts will be repealed.

Conventioning — The ARBA meeting in Atlantic City, while not particularly well attended, presented one of the outstanding programs of recent years. General sessions this year presented discussions of many different topics, representative of the activities of several of the divisions. This meeting, more than ever before, had the flavor of a meeting of industrial people and contractors, since other divisions of the Association, with the exception of the County and Local Officials' Division, were very poorly represented. A session on compaction of soils was well attended; chief concern of the group at the moment seemed to be the problem of effectively and cheaply drying excessively wet soils in wet weather. Nobody has a real solution to that one yet. Glenn Richards, Director of Public Works for Detroit, delivered

a hard-hitting speech urging the formation of an overall group representing all highway interests in order to present a unified approach to highway financing problems. One of the best comments we heard was that of Bob Glenn of the University of California, who said, "We have plenty of toll roads, (i.e., expressways) in California—only difference is they are free roads." We understand the 1955 meeting will be in New Orleans, 1956 in Miami (maybe) and 1957 in Chicago with a Road Show. The site of the 1957 convention was hotly contested, with Miami

making a strong bid for it. We and a lot of contractors were disappointed over the manufacturers' selection, but I guess they know their own business best.

Wandering — We're looking forward to the Highway Research Board meeting in Washington as this is being written. Tell you all about it when we get back, if you didn't have a chance to go. Interest in the possibility of building an east-west toll road from Detroit to the Indiana line has revived recently after the submission of a report by

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Hattendorf-Bliss have standardized on *Clevelands* for over 20 years. Currently the firm is working 9 Cleveland trenchers and backfillers for many types of trench work. In one 10-hour day, a Hattendorf-Bliss crew with one Cleveland trencher completed 11,000 feet—

over 2 miles—of trench 19" wide and 30" deep for a 4" pipeline, including the crossing of a 20' stream.

"We go with *Clevelands*," say Hattendorf-Bliss, "because we know from experience they'll do every job we schedule them for. They stand hard usage and they're fast. Their full-crawler mounting and low bearing pressure protect lawns and sidewalks—we practically never have a damage claim. And because they're compact and easy to transport, we can really cover the distance between jobs with safety at good speeds."

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a firm of consulting engineers calling the proposal "logical and feasible, both physically and economically." New Orleans recently laid the first section of "rubber road" in Louisiana; a portion of old St. Ann Street was paved under the direction of Albert G. Wyler, City Engineer, as a demonstration during the 59th annual convention of the American Public Works Association. An expressway linking Boston and Montreal has been proposed by Senator Aiken of Vermont; such a project is estimated to have a minimum cost of \$325 million and probably would have to be built as a toll road. In a statement made during the recent national conference on highway financing, G. Albert Hill, Commissioner of the Connecticut State Highway Department, advocated the increased use of the semi-toll or limited toll road, which means a highway with toll stations at selected locations charging flat rates but with points of free entrance and free egress between the stations.

Who Went Where?

An interesting news item appeared in one of the *Winnipeg, Man.*, papers: "Water Consumption Soars During Half-Time Break—Winnipeggers were panting in sheer excitement listening to Saturday's thrilling east-west football classic. Glued to their radios, football fans couldn't spare a minute away from the nip and tuck game that saw Tiger-Cats march off with the Grey Cup. But half-time time—as one man—fans rushed to ease parched throats and zoomed the water consumption for the city up approximately 62,500 gallons. Water is usually pumped to city homes at the rate of 18 million gallons a day. At intermission time it increased to the rate of 22½ million gallons, and after intermission slackened to a rate of 19 million gallons a day."

Farm Road Progress in Texas

A dramatic report on farm road progress in Texas was made to the 32nd annual convention of the County Judges and Commissioners' Association by Highway Commission Chairman E. H. Thornton, Jr. Some 23,000 miles of farm roads have been built in Texas since World War II at a cost of \$264 million, leaving only 12,000 miles to go on the present 35,000 mile goal. He estimated this goal would be reached in another five or six years.

Lighting and Traffic Control



● EXIT RAMP from underground garage at United Nations headquarters is illuminated by flush-mounted Crouse-Hinds lighting fixtures set in walls below eye level.

Wall-Mounted Lights Illuminate Ramp Without Glare

NEW YORK, N. Y.—Two different types of wall-mounted roadway lights have been installed at the main entrance of the United Nations in New York City. Type VCD-12 roadway lighting fixtures illuminate the driveway in front of the General Assembly building; type RL ramp lights are in use along the ramp entrance and exit to the UN garage. Both types are manufactured by Crouse-Hinds Company, Syracuse, New York.

The roadway lighting fixtures are of cast aluminum and contain an Alzak aluminum reflector, standard 200-watt incandescent lamp, inner lens of the asymmetric Fresnel type and outer prismatic lens. There is a hinged door for easy relamping

and an adjusting screw for beam control.

The ramp lighting fixtures—a new flush-mounted type made especially for installation at the UN—is a rectangular aluminum housing containing a 200-watt standard incandescent lamp, Alzak aluminum reflector cover and prismatic lens.

These wall-mounted lighting fixtures concentrate a narrow beam of light on the road area. To prevent glare and to define the roadway sharply, they are mounted below the eye level of both pedestrians and motorists. There are no shadows cast by moving cars since the beams of each unit overlap—covering every spot on the roadway or ramp from several directions.

MERCURY VAPOR LIGHTING for Waco's New Sewage Treatment Plant

The new sewage treatment plant for Waco, Texas, will be of the standard rate trickling filter type and will be designed for an average flow of 12 mgd, but the piping will be capable of handling a peak flow of 45 mgd. The filters are designed for a loading of 450 pounds of BOD per acre-foot. In the design, particular attention was paid to use of as many as possible of the old plant units. The old plant was of the activated sludge type, built 30 years

ago for a flow of 3 mgd and now greatly overloaded.

The entire site of the new plant will be lighted with mercury vapor lights, permitting safe and efficient operation by night as well as by day. Complete landscaping of the site is also a part of the program now under way.

The project also includes a large sewer construction program, involving vitrified clay pipe for lines under 24-inch and reinforced concrete

with rubber gaskets for all lines 24-inch and larger. During construction of the plant, the sewage will be treated in lagoons before discharge into the Brazos river. Drahn Jones, who has been City Engineer of Waco, in charge of this work is now Director of Public Works of Corpus Christi.

Traffic Signs Get New Faces

Traffic sign faces of 30-gauge steel and reflectorized, made specially for fitting over defaced or damaged traffic signs right on location and without taking the signs out of service, are being used extensively by the First District of the Kentucky Highway Department. The cost of these traffic sign faces is about half that of replacements. The fact that



● NEW "EZ-ON" traffic sign face can be applied in less than three minutes.

they are applied right over the sign in the field saves the expense of hauling the old signs to the shop and returning them to the field. Faces are made in two styles—octagonal and triangular; and in two sizes—24-in. and 30-in. They are manufactured by Grace Sign & Mfg. Co. of St. Louis.

Durable Traffic Markers

After five years use under heavy traffic on a concrete street ramp in Portland, Oregon, the waffle design of the Tenite traffic markers etched the concrete pavement to a depth of 3/32 of an inch.

PUBLIC WORKS DIGESTS

THE SEWERAGE AND REFUSE DIGEST

Sanitary Biology in Waste Treatment

Compared to bacteriology, sanitary biology as applied to stream sanitation and sewage treatment is an infant science. The biologist deals with a wide variety of organisms which range in size from minute flagellate protozoa to annelid worms, insect larvae, and fishes. They include infusoid protozoa which, in the activated sludge process, indicate an overloaded plant. In trickling filters, the filter on the rocks contains fungi, filamentous algae; small protozoans which feed on substances dissolved in the sewage, and larger protozoans and rotifers which consume large numbers of bacteria. It is important to cultivate and maintain in filters a balanced scouring or grazing fauna such as worms, insect larvae and the like, to prevent ponding and assist in stabilizing the sewage. There is need for more emphasis on biological research on a pilot-plant scale to determine the most efficient means of operating oxidation pools. Studies on a similar scale of trickling filters and sludge digesters are contemplated by the biology section of the U. S. Public Health Service at Cincinnati.

"How Sanitary Biologists Contribute to Waste Treatment Processes." By John N. Wilson, Biologist U.S.P.H.S. *Water & Sewage Works*, December.

Rapid Construction Of a Treatment Plant

Levittown, Pa., a city for 60,000 population, is being constructed in four years, with the first houses to be occupied in 7 months after the start. Both sewage treatment plant and water supply adequate for the early settlers were completed in that time. This did not give sufficient time for preparing complete plans and specifications before letting construction contracts, and lump-sum contracts were let on outline plans and brief specifications, the con-

tractors to fill in the details from their past experience in constructing similar projects. In spite of this, three bids were received which differed less than 10% from highest to lowest, and extras amounted to only 2.7% for the complete plant, more than half of these due to unforeseen subsurface conditions. Bids were received for two sizes of plant, for 30,000 and 60,000 population respectively, and the low bid for the larger exceeded that for the smaller by only 30%. The contract was let Dec. 5, 1951, and by May 1, 1952 the plant was given primary treatment to the sewage from the houses occupied at that time; and by May 1, 1953 the entire plant was completed. When operation began with primary treatment in 1952, only one of 4 primary tanks was placed in operation, the other 3 being used for sludge storage.

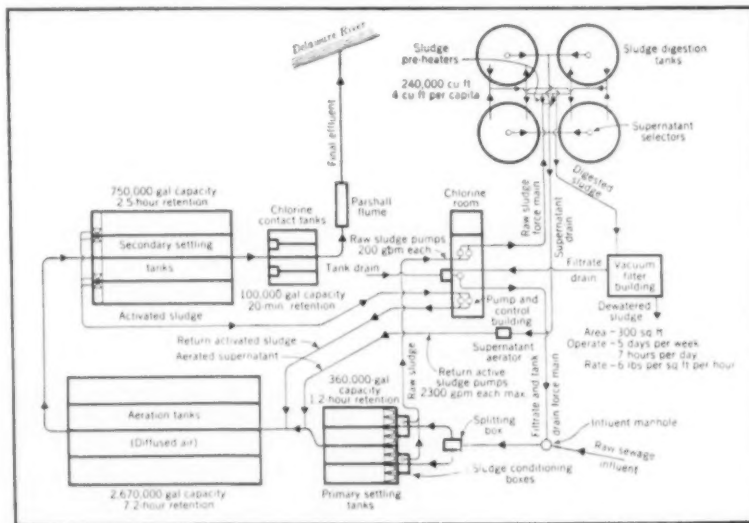
The plant provides complete treatment for 7 mgd of standard-strength sewage; primary settling tanks, aeration tanks, chlorine contact tanks, and sludge digestion tanks with

capacity of 4 cu. ft. per capita. Coil spring vacuum filters handle the sludge, which will be used for land fill. Some unusual features are a sludge supernatant aerator and aeration of all channels carrying mixed liquor; water sprays to control foaming on the aerator; three 3-speed air blowers to permit adjustment of air quantity to oxygen demand.

"Sewage and Water Facilities Built for a City in the Making." By Alfred A. Estrada, Consulting Engr. *Civil Engineering*, December.

Reclaiming Sewage By Spreading Ponds

A research has been conducted by the California State Water Pollution Control Board to learn the answers to several questions relative to the reclaiming of sewage effluents by means of spreading ponds or injection wells. The results of 28 months of investigation have recently been published by the board. These showed that a bacteriologically safe water can be produced from settled sewage or from



● FLOW diagram for 7 mgd plant to treat flow from 60,000 population.



Lithographed on stone for U. S. Pipe and Foundry Co. by John A. Noble, A. N. A.

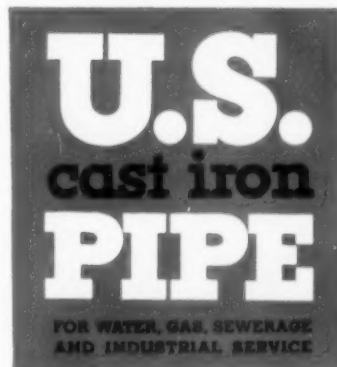
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final effluent if the liquid passes through at least 4 ft. of soil; also one of satisfactory chemical quality if the applied wastes do not contain high concentrations of undesirable chemicals. On fine, sandy loam, a percolation rate of at least 0.5 acre-foot per acre per day can be expected if a highly treated sewage effluent be spread. The best method is to spread continuously for a month, rest and cultivate; after which the application periods can be increased to 6 months. Control of mosquitoes and algae may be necessary. During the test, sewage odors were only occasionally observed. Details of the test are described in the article.

"How Waste Water Reclamation Affects Ground Water Pollution."
PUBLIC WORKS, January.

Accelerated Sludge Digestion in Columbus

In 1930, Columbus, O. built a treatment plant in which digestion was provided for by 8 fixed-cover type tanks of 70 ft. diameter and 25 ft. side wall water depth. At that time the loading was 3.07 lb. of solids per cu. ft. per month. Increased population and the use of garbage grinders, especially for commercial garbage (which amounts to 60% of the total dry solids load) made increased capacity necessary, and 8 new tanks were added, 85 ft. in diameter and 23 ft. water depth, giving, in 1950, 1.74 lb. per cu. ft. per month. By 1952 this had increased to 2.3 lb., and the necessity of additional capacity in the near future was evident. The possibility of increasing the capacity of the present tanks instead of building new ones was suggested by the development, by the Chicago Pump Co. of the Catalytic Reduction Process, and a contract was let to install the equipment for this process in one of the 70-ft. digesters, with a capacity of 7.7 lb. per month per cu. ft. of tank capacity, the volatiles to be reduced to an average of 50% of the total solids, which was estimated to be a reduction of 35.3% of the volatile solids—the average performance of the existing tanks for the previous ten years. After breaking in the plant and some experience in operating it, the volatile solids were being reduced 41.5%, although the tank was being loaded in excess of the prescribed amount during the greater part of the time. Some refinements of the process remain to be studied, but it promises to be a practical and economical method of vastly increasing sludge digestion capacity, and the city ex-



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pects to use the process when further increases in capacity become necessary.

"Accelerated Sludge Digestion Successful at Columbus, Ohio." By James H. Blodgett, Supt. Wastes Engineering, December.

Sewering a Low, Flat Area

The sewerage of the low, flat land between New Orleans and Lake Pontchartrain presented several new features, both engineering and financial. As the entire area is practically level, much pumping of the sewage is necessary. A number of small pumping stations (the number may reach 20) will lift local sewage to a force main, and this in turn will carry it to a main pumping station, where it will be re-pumped to a main sewer in the developed section of the city. The force main is composed of 7,300 ft. of 24 and 30-inch steel pipe with Dresser couplings. It was laid with an average cover of 4 ft. in wet, very corrosive soil. It was coated with Bitumastic. Electrical conductivity bands were provided at each joint and the main is protected electrolytically; and it was laid in and entirely surrounded with sand to protect it from the corrosive soil. It crosses under an industrial canal in a trench 50 ft. deep, the depth of the water in the canal being 35 ft. When the main was tested under a pressure of 100 lb., the leakage was only 2.5 gal. per inch diameter per mile per 24 hr. (50 gal. was the specified limit). The small pumping stations contain pumps set 5 or 6 ft. above the invert of the entering sewer, started and stopped automatically. They and all the subsidiary mains are paid for by the building developers, the city providing only the force main.

"Steel Force Main Provides Sewerage for Residential Area." PUBLIC WORKS, January.

Responsibility of Industry for Clean Streams

It frequently has been said that abatement of a given industrial pollution cannot be ordered unless a reasonable means of treatment is available. The author believes that this excuse should not be accepted unless adequate study is being made by the industry to find the means of treatment; as is being done by the Pulp, Paper and Paperboard Industries, Inc. He suggests that the amount of money spent on such study should be equal to "the cost of operating interest and authorization of the so-called reasonable cost

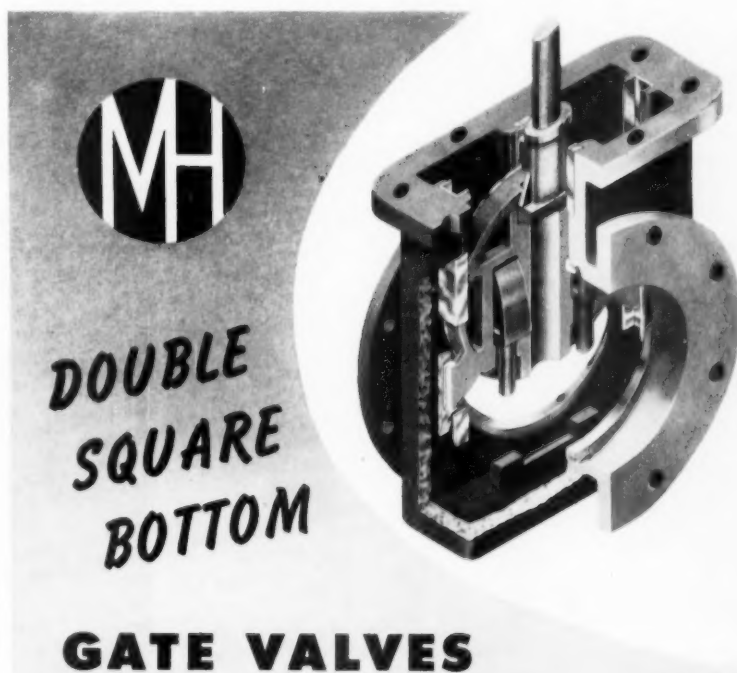
to build and operate treatment work if a method were available." If such annual expenditures by the industries were required, he feels sure that adequate treatment methods would be found in a short time.

"Recovery of Polluted Streams." By Seth G. Hess, Chf. Engr., Interstate Sanitation Commission. Water & Sewage Works, December.

The Deepest Sewage Outfall

The Los Angeles County Sanitation Dist. is extending an existing 72-in. sewage outfall so as to dis-

charge at depths exceeding 150 ft. and distributed over a wider area. The outlet has been discharging in 100 ft. depth of water a mile out from shore, but sampling surveys have shown evidence of sewage contamination. To eliminate this, the outfall is being extended 1800 ft. and will terminate in two 48-in. lines each 200 ft. long and separated by a 120° arc. Over 600 outlet holes are provided, located at 24-ft. intervals on each side of the new outlet pipes, and designed to jet the sewage into the ocean. It is expected that diversion of the sewage over



When it is desired to install a gate valve for throttling purposes, or in a vertical pipe line, M & H double square bottom valves have many important advantages.

When valve is opened, each of the three shoes on both discs immediately contact the feathered edge of the tracks. These three contacts result in the disc being eased away instantly from the seat. The shoes then ride the tracks squarely and firmly for the full travel of the disc. In closing, discs ride the tracks down to a point exactly opposite the valve seat. At that point, the discs are clear and free to seat by action of the two spreaders, each functioning independently of the other. The tracks are stainless steel channels and the two side shoes are bronze-faced.

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The Department of Sanitation in support of its preference for the escalator compactor body cites the following among its reasons:

1. Universal use of the unit on all types of collection service at maximum efficiency. Unit can be assigned to any collection route whether on straight ashes, garbage or mixed refuse. This flexibility of assignment is especially important in the light of the extension of the incinerator program and the separation of ashes.
2. Due to a smaller hopper opening there is less spillage both on the part of the loaders and as a result of winds. Likewise the operation is more sanitary since the loaders are not exposed to the refuse and odors as is the case on a batch-type large hopper.
3. Batch-type unit is a single purpose truck for mixed material and not fully satisfactory for straight collection of ashes.
4. As a continuous loader, the escalator compactor unit daily payload performance is greater than the batch-type unit.
5. During a comparable nine month period of the term of the manufacturer's guarantee on the latest deliveries of 210 escalator-type and 140 batch-type units the average percentage of lost days due to repairs to days assigned to district garages in the case of the escalator unit equalled only 1.8% while for the batch-type the average percentage was 19.5%.
6. The Consulting Engineers employed by the Mayor's Committee on Management Survey to study the operations of the Department of Sanitation recommended that the escalator-compactor type collection truck become the standard collection unit for future purchases.
7. It is the Department of Sanitation's intention to standardize its refuse collection truck fleet on the escalator type....



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such a wide area and such great depth will result in its being cooled to a temperature below that of the ocean surface as it rises through the comparatively cool deep water.

"Deepest Ocean Outfall for Sewage Diffusion." *Engineering News-Record*, Dec. 24.

Filtration of Frozen Sludge

Chemists of the London (England) County Council have for about five years been experimenting with freezing of sewage sludge before filtering it. Recently a plant was constructed designed to freeze a ton of ice a day, using methyl chloride as a refrigerant. It was found that this plant would freeze only about 1500 lb. of sludge a day, 360 lb. at a time, freezing time 3½ hr. For filtering this sludge after thawing, a vacuum filter was used first, giving cakes with 20 to 27% dry solids, but the cloth blinded rapidly. Then they tried covering the cloth with a nylon fabric, which increased the filtration time but left the cloth clean after removing the

cake. Several other filtering materials were tried, the most successful being a fabric woven from a polyvinyl-chloride mono-filament.

"Further Work on the Sludge Freezing Process." *The Surveyor*, December 5.

OTHER ARTICLES:

"Handling Acids, Cyanides and Metal Wastes." By John W. Townsend. *Wastes Engineering*, December.

Property value increased by landfill in Des Plaines. "How Sanitary Landfill Solved Our Refuse Problem." By E. R. Warnicke, Supt. of Pub. Wks. *PUBLIC WORKS*, January.

Design criteria for a joint treatment plant. "Economics in Sacramento's Sewage Treatment Plant." By Guy Browning Arthur. *PUBLIC WORKS*, January.

Sanitary landfill should be thoroughly compacted with heavy equipment. "Go Heavy on Compaction." *American City*, December.

"Safety in Sewage Works Maintenance and Operation." (Sixth installment). By Leroy W. Van Kleeck, San. Engr., Conn State Dept. of Health. *Water & Sewage Works*, December.

How the Roadside Clean-Up Problem Is Handled by Counties

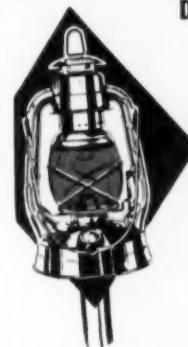
THREE questions on generally little-considered problems of county engineers and superintendents were included in a recent survey and questionnaire by the Editors of *Public Works*. These had to do with (1) Are county highways swept regularly and what equipment is used for sweeping; (2) what equipment and/or methods are used to keep roadsides clean of trash; and (3) are sanitary fills or dump areas provided and operated by the county for handling the refuse of people living outside of areas where refuse is regularly collected?

Approximately 800 replies have been received to the basic questionnaire which covered many other items as well. The data here are from the first 440 questionnaires returned to us. About 2350 counties do an appreciable amount of highway work.

Sweeping Highways—In all, 49 counties reported sweeping county highways regularly, but it seems apparent from an examination of the replies that some of these misunderstood the question to some extent. Sweeping of bridges only was reported by three counties; and of intersections only by one. Lengths of highways reported swept ranged

up to 600 miles, but in the case of about one-third of the reporting counties the distance was less than 15 miles. Equipment used was reported as follows: Power sweeper 3; rotary broom 11; towed broom 3; power broom 0; Wayne sweeper 2; Austin-Western sweeper (or broom) 4; Elgin sweeper 3; Hough rotary broom 3; Littleford power broom 1; and hand brooms 4. These are precise terms used; it will be noted that in many cases the different terms mean the same kind of unit. One county uses flush trucks and leaf collectors; and two reported using magnets to sweep part of the county road system.

Keeping Roadsides Clean—Here is a place where there is a real need for some reliable and effective mechanical equipment to replace costly hand labor. Of the 183 counties answering the question, 91—just about half—rely on hand work by maintenance crews or patrolmen, equipped with a truck. Another 33 report merely "hand labor" and 3 use prisoners. The remaining 56 employ a variety of means—motor graders, blades or patrols are used by 18; mowers by 16; spraying with chemicals by 4; front-end loaders, Athey loaders and rakes by three

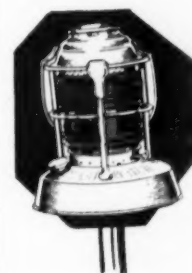
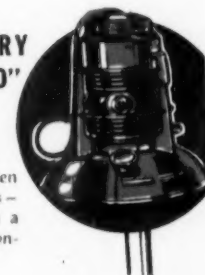


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each; also mentioned were brooms, discs, bulldozers, refuse barrels and sweepers. Perhaps, again, the question that has not been given much consideration; or if it has been considered, it has not been solved. It does not seem that any county can afford to have two men and a truck (the most generally reported work unit) spend very much time picking up such trash and junk by hand.

County Sanitary Fills—Subdivisions outside city limits have sprung up all over during the past few years. Many of these areas, though urban in nature, have no facilities for regular garbage and rubbish collection. Hence there is the necessity for homeowners to dispose of such wastes themselves. In far too many cases, there are no local facilities available, no place where this waste may be dumped and taken care of. So a convenient place along the highway, or perhaps along a back road is chosen. Some counties have recognized this problem which, of course, is far less serious in predominantly rural areas.

A total of 45 counties replied affirmatively to our question on this subject: 37 of them stated that they operate sanitary fills or dumps to serve the public. In addition, there were these replies: The Health Department operates the dumps in two counties; one county is planning to start a sanitary landfill; one county cooperates with a city and one uses the city disposal facilities; and in three counties such disposal areas are operated by townships within the county.

Increased Use of Garbage Cooking

The sixth progress report on developments on eradication of vesicular exanthema has been released by the Agricultural Research Service of the U. S. Department of Agriculture. The report states that 54% of the 12,288 garbage feeding establishments in this country are known to be cooking garbage. In addition, 45% of such establishments are now being inspected regularly. According to the latest figures twenty four states are conducting semi-monthly inspections of premises where garbage is fed to swine.

A large in-place installation is

now being planned for Kansas City, Missouri. City Manager L. P. Cookingham recently authorized the public works department to install four 15-ton capacity heating vats on its hog feeding lots. The city has operated a municipal piggery for a number of years and last year the city grossed \$75,000 from the sale of hogs. The practice of cooking all garbage that is used as swine feed has been followed for several years and is now required by state law.

Doc Symons

(Continued from page 16)

the only man who has been president of both the AWWA and the FSIWA is a Canadian, Dr. A. E. (King Bertie of Michigan) Berry.

And What's In Store for '54—Your issues of PUBLIC WORKS MAGAZINE will reach you about the first of each month instead of the middle. —And "Bill" Hardenbergh, Lew Morris, and Art Akers promise more new ideas in P.W.

—No one will be able to attend all of the meetings he'd like, because there will be more than ever before what with all the water, sewage and

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industrial waste groups now active.

—The big meetings of '54 will be the AWWA Convention in Seattle, May 23-28, and the FSIWA meeting in Cincinnati in October. Runners-up as usual will be the meetings of the NEWWA and the Southwest and California Sections of AWWA.

—There will be a continued growth of one-day small sectional organization meetings as chronicled regularly in my "News Notes from Brushy Bend."

★ ★ ★

—This column will continue to interest, amuse, inform or annoy you as the case may be and V. T. Y. may do something in a heavier vein in the main reader section of PUBLIC WORKS.

—The water works profession will become more conscious of: (1) the need for long range expansion planning in facilities to meet the evergrowing demand for water, (2) the need for higher rates and (3) safety.

—Fluoridation will continue to grow in spite of crackpot opposition and the high pressure advertising of tooth pastes which prevent tooth decay.

—Sewage and industrial waste treatment will move forward with

the aid of Pete Wisely and his new assistant for research in the Federation Staff.

—More and more persons will talk about the use of the word "hydro-wastes" instead of sewage as suggested by Mrs. Ralph Fuhrman of Washington, D. C.

—Manufacturers of equipment for water and sewage works will introduce some new ideas for flow measurement, chemical feeding, controlling and treating water, sewage and industrial wastes.

—And barring the unforeseen, I'll attend some of the conventions I had to miss last year for one reason or another.

★ ★ ★

News Notes from Brushy Bend—The Third Southern Municipal and Industrial Waste Conference will be held on Mar. 18-19 at North Carolina State College, Chapel Hill, N. C. V. T. Y.—*Doc Symons*

• • •

Water Analyses

(Continued from page 67)

CaCO₃. The results of titration with phenolphthalein indicator are expressed as phenolphthalein alkalinity. The phenolphthalein alkalinity

is always zero in the presence of free carbon dioxide. Conversely, when phenolphthalein alkalinity is present, there is no free carbon dioxide. If no phenolphthalein alkalinity is present, all of the alkalinity is assumed to be bicarbonate alkalinity. If twice the phenolphthalein alkalinity is less than or equal to the methyl orange alkalinity, it is assumed to be carbonate alkalinity. If twice the phenolphthalein figure exceeds the methyl orange alkalinity, the excess is presumed to be caustic or hydroxide alkalinity.

The value of this test is that it indicates the presence of carbonates and water that is relatively non-corrosive.

Chloride Ion (Cl). The chloride ion is present in water usually combined with sodium, calcium and magnesium and is corrosive. These chlorides should not be confused with nascent or free chlorine that is sometimes added to purify water.

pH. This is the unit commonly used to express numerically acidity and alkalinity. The pH value of a neutral solution is 7, values above

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Sewage sludge disposal can be a cost or a profit item. Instead of paying to have it burned, buried or hauled away, why not process it with a Royer Sludge Disintegrator into a ready-to-use fertilizer? Sludge cake with moisture content as high as 56% can be shovelled directly into the Royer where it is completely shredded, pulverized, aerated and discharged to pile or truck, with all trash removed. Additional fertilizing ingredients may be added if desired.

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this representing alkalinity, those below acidity. The pH of normal water supplies ranges from about 6 to about 8.

The above values with the exception of pH, which is an abstract number, are expressed as parts per million by weight. That is, one part per million means that one gram of the constituent is present in one million grams of water, or one pound in one million pounds of water, etc.

The constituents described above are not the only constituents of a water, but are those most convenient to determine and which give at the same time maximum information about the water from a corrosion standpoint. Other constituents in a water are the elements, sodium, calcium, magnesium, iron and aluminum; the sulphate, nitrate, carbonate and bicarbonate radicals; and silica and organic matter. Since water is a universal solvent, small amounts of many other elements might be detected in a water by a patient analyst.

For convenience, one may group waters into several general classifications as set forth in the following paragraphs.

Group I—Relatively Protective Waters. This group of waters is characterized by being protective to plumbing materials in general. The essential characteristics of such waters are a relatively high carbonate hardness, low free carbon dioxide content, low salinity and an alkaline pH value. The carbonate hardness in such waters is the determining factor in giving the protection. This is because the carbonate hardness results from the presence of calcium and magnesium bicarbonates, which with release of pressure and particularly elevated temperatures result in breakdown to normal carbonates and carbon dioxide. The carbonate so precipitated forms a continuous adherent and usually bulky deposit on the pipe or tube which prevents further direct contact of the water with the metal surface and therefore any appreciable corrosive action. These waters are normally protective to plumbing materials.

Group II—Moderately Corrosive Waters. Most of the larger municipal water supplies are moderately corrosive. They are characterized in general by moderately high carbonate hardness, low free carbon dioxide, low salinity and an almost

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neutral pH value. The essential difference between waters of this group and those in Group I is the lower carbonate hardness in the present group, which means a practical absence of tendency to precipitate lime. In the absence of the protective effect of lime deposition, the salinity even though low does tend toward moderate corrosion. Such free carbon dioxide as may be present usually enhances the corrosive tendency. Red brass pipe (85% copper, 15% zinc) or copper water tube is suggested for hot and cold water lines because they provide good corrosion resistance against these waters.

Group III—High Salinity Waters.

Waters in this group are characterized by high salinity which is a strong, directly corrosive influence. Free carbon dioxide is usually low. The carbonate hardness varies over a wide range and the pH value is close to neutral. For plumbing considerations, waters in this group should include mine waters or others containing free mineral acids, low carbonate hardness, high sulphate content and a low (acid) pH value.

Red brass pipe is preferable for hot and cold lines for these types of waters. Copper water tube, mainly because of its thinner wall, would be second choice. High salinity waters are very corrosive to yellow brass (66% copper, 34% zinc) and iron and steel.

Group IV—High Free Carbon Dioxide and Low Carbonate Hardness Waters. Waters with a high free carbon dioxide content, moderate carbonate hardness, low salinity and an acid pH value are classified as corrosive because of their free carbon dioxide content. In waters with low carbonate hardness the free carbon dioxide may be low. This type of water is also corrosive and may cause green staining with the use of plain copper or brass plumbing materials, or rusty water and rust stains with the use of iron and steel.

Tin coated copper water tube is often suggested to eliminate green staining. Where untinned copper alloys are in use, effective elimination of staining may be obtained by treating the water. Information on treatment can readily be procured from a consulting engineer or the State Department of Health.

Red brass pipe is the best plumbing material for handling the waters included in this group. Copper water tube would be second choice.

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February, 1954

New Dust Collectors for Water and Sewage Plants

Wallace and Tiernan Units Control
Nuisance and Toxic Dusts

NEWARK, N. J.—Two models of the new W & T dust collectors are now available for the effective removal of nuisance and toxic dusts raised during hopper loading or other handling or feeding of dry chemicals. The hopper-mounted model has a built-in loading chute and returns dust directly to the hopper when the filter tubes are agitated. The floor-mounted model has a 4-in. diameter inlet connection and collects dust in a pail. Both models are housed in a circular case and have a capacity of 400 cfm. Dust is collected on the outside of the filter tubes which provide a total filtering area of 60 square feet. During operation, the entire collector is under a vacuum so there is no leakage of dust.

A complete description of these dust collectors is given in Publica-

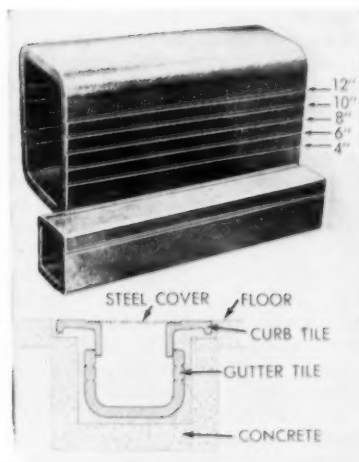


Dust hazards in treatment plants are eliminated with new W & T collector.

tion No. TP-2-M, available from the manufacturer, Wallace & Tiernan Company, Inc., 25 Main Street, Belleville, New Jersey. Or use PW Reader Service Card, No. 2-1.

"Chemi-Drain" Channel Pipe for Corrosive Wastes

Vitrified Clay Units Are Furnished in Double Sections Which Split
At Grooves to Make Channels of Desired Depth



LOGAN, O.—"Chemi-Drain is an entirely new type of channel pipe. Designed by Dow Chemical and manufactured by Logan Clay Products Co., it is available for drains and gutters for any corrosive service. It is made of vitrified clay, in double sections, with five grooves or kerfs in each side so that any desired depth is obtainable between 4 and 12 ins. A curb tile is used to cover the upper edges of the channel pipe, making the installation perfectly flush with the floor; and the channel can be covered with a grill or solid floor plate. Should be fine for sewage treatment plants. For specifications and technical data write the manufacturer or use Reader Service Card, No. 2-2.

Traffic Line Marker Handles Standard and Reflective Bead Paints

NEW HOLSTEIN, Wisc.—A new centerline traffic lane marker, that handles both reflective and standard paints, and incorporates a unique rear steering device has been announced by the Meili-Blumberg Corp. of this city. The Model 6-18 has an 18-gallon capacity and is powered by a 6 hp Wisconsin engine. It lays a single line, solid or intermittent, with or without reflective beading, at a rate of 3 to 5 miles per hour. The spray gun can be set for center line marking, or may be mounted on a frame outside of the wheels, either right or left, thus permitting close work up to safety islands, curbs, etc.

The unit is self-powered with a pivot arrangement of the rear wheel, enabling the machine to be steered easily in circles, figure 8's, straight lines or to any desired marking job. The operator rides on the built-in trailer platform with all controls conveniently within reach, and complete visibility for operating and steering. Additional features include a paint strainer in the circuit; air actuated gun; positive acting paddle type paint agitator; cleaner tank; fast acting control valve and an 18-gallon A.S.M.E. approved safety tank. More by using PW Reader Service Card, No. 2-3.



Versatile M-B traffic line marker sprays standard or reflective paints.

Sherman Diggers for 1954 Show Many Improvements

ROYAL OAK, Mich.—Design and engineering advancements in the latest models of Sherman hydraulic power diggers assure extra performance, greater economy and durability according to W. F. Beckman, director of sales of Sherman Products, Inc. The dipstick, for instance, is now of fabricated box construction, insuring strength to meet the most severe operating conditions. It is now available in two sizes for depths of either 8 or 10 feet.

A redesigned swing control system provides better throttling control and positive, smooth action as fast or slow as operating conditions require. New, self-leveling hydraulic stabilizers are another outstanding improvement. These act separately instead of in unison, conforming to the terrain in which the digger is being operated, regardless of irregularities of the surface soil, and making it possible to dig plumb on slopes. New manganese alloy steel shovel teeth, together with replaceable points, contribute to longer life and easier replacement. A new



Extra performance has been designed into the new Sherman Power Digger.

design and method of mounting distributes the thrust of the digging operation, relieving direct strains on the entire unit, tractor as well as digging equipment. With these improvements, Sherman Diggers are now adaptable to certain models of Case, International Harvester and Fordson Major tractors as well as Ford and Ferguson tractors.

Free literature is available on request from Sherman Products, Inc., Royal Oak, Michigan. Or use PW Reader Service card. Circle No. 2-4.

Versatile Loader Unit for Oliver OC-3 Tractor

CHICAGO, Ill.—A new, versatile, multi-purpose model loader unit has been announced by The Oliver Corporation for the model "OC-3" Industrial crawler tractor. The loader is all-hydraulic in operation and balanced and mounted for efficient use. Outstanding operational features include extreme bucket rotation that permits dumping from ground level to full lift height. The bucket angle in dump position is 75° from level at ground level, 55° from level at full lift height. Full lift height is 10 ft. 9 ins., with



Full bucket rotation and high lift helps on both filling and dumping.

bucket level. The bucket can be used to dig to a depth of 16 ins. below track level, or the bucket may be used for leveling, scraping and stripping operations. Bucket capacity is $\frac{1}{2}$ cubic yard and lifting capacity is 2000 pounds.

Of interest is the versatility of the tractor-loader for year-round operation. It can be used as bulldozer, backfiller, lifting boom, lifting fork and snow plow. All attachments can be added quickly and conveniently to the basic loader arms without special tools. Portability is another advantage to these users. It takes only a light trailer or truck to transport the Tractor-Loader from job to job. Attachments can be carried right along with the unit and added on the job for greater convenience.

The all-hydraulic operation of the loader is a distinct advantage when down pressure is needed, especially in the case of the bucket, bulldozer, backfiller, and snow plow. In loading operations, down pressure gives deep penetration of the bucket with a "break-out" action equal to 3 times the lifting power of the loader. Bucket level is automatically maintained when lifting a load, and exceptional bucket roll-back prevents wasteful spillage. For more data check PW Reader Service No. 2-5.

One-Ton Motor Driven Roller for Many Small Jobs

WINDSOR LOCKS, Conn.—Gabb Special Products announces a newly designed one-ton "Motoroller" having 56 lbs. per sq. in. compaction. This will be on the market early in 1954. Special features of this roller include a newly designed center-poise hook-up which insures perfect tracking of the front and rear rolls; geared steering; low center of gravity for working on grades and slopes; compact frame structure with a minimum of overhang; water ballast drums; dual drain plugs; and heavy duty transmission. For data circle No. 2-6 on Reader Service card.

Batch Type Bituminous Plant for Large Jobs

CEDAR RAPIDS, Ia.—To meet demands for greater production of asphaltic concrete for modern wide highways and airport jobs, a new



Plenty of capacity for big paving jobs in new Cedarapids Model G-60.

batch-type bituminous mixing plant has been announced by Iowa Manufacturing Company. The new Model G-60 is the largest bituminous mixing plant in the Cedarapids line. It is redesigned from the Model E type plant with 50% greater capacity. Its 65 cu. ft. aggregate batcher and 60 cu. ft. mixing unit permit capacities ranging from 5000 to 6500 pounds per batch, depending upon aggregate weight per cubic foot, percentage of asphalt, screening conditions, and plant drier capacity.

The plant may be operated manually or semi-automatically with full pneumatic controls, or batching and control equipment may be completely automatic and controlled electronically (optional). Electric time and sequence locking system controls mixing time periods, bitumen batcher gates, aggregate

batcher gates, and discharge gate of the mixing unit. The closely controlled batching of this model enables the contractor to change the type of specification mix with practically no delay. Several types of mixes may be run the same day without loss of production and no loss of time for operational change-over.

Optional equipment includes electronic control equipment for complete automatic weighing and fully automatic mixing unit operations, time locking equipment, mineral filler attachment, extension for hot

elevator and extension for hot storage bin to increase bin capacity to 47 cu. yds.

For portable applications, the mixing unit and screen-batcher unit are equipped with running gear with self-contained erecting equipment. For stationary applications, the units are furnished without the hinged tower structure column bases, running gear, or power erecting equipment.

Details and specifications upon request from Iowa Manufacturing Co., Cedar Rapids, Iowa, or circle No. 2-7 on the Reader Service Card.

New Rubber Mounted Bituminous Paver

ELYRIA, Ohio—Announcement of a rubber mounted bituminous paver and finisher, is made by All Purpose Spreader Company of Elyria. This new machine will spread, level, and tamp hot or cold bituminous mix in one continuous operation; and it can be used in paving pugmill mixed lean cement mixtures. No forms are required for any of these paving jobs.

The rubber mounting design offers sure traction on hard surfaces with tack coats or on spongy subgrades and other "tricky" surfaces. Back-tracking is faster and quieter—newly laid surfaces can be crossed sooner. Rubber tires provide traction necessary to push heavy dump trucks. An indirect benefit of rubber mounting is the smoother action in starting and stopping.

Another design feature of interest to contractors is the longer wheel base and floating type screed which produce results with fewer passes—particularly where there have been numerous dips and bumps in the sub-grade. Other features include: the large capacity, low-cut hopper to accommodate large dump trucks; dual-drag type conveyors, individually controlled; vertical ad-

justment of the cross augers; dual controls; etc. Overall length is 19 ft. and width is 10 ft. Approximate weight is 20,000 lbs. Spreading width is to 13 ft.; spreading depth is 10 ins. Eight working speeds range from 18 to 74 ft. per minute while travel speed is 5½ m.p.h. Complete specifications are given in a new folder. Ask for it on PW Reader Service card; circle No. 2-8.

• • •

A new line of high capacity chlorinators (called the Figure 1053 Ratachlor) has been announced by Fischer & Porter Co., Hatboro, Pa. This equipment offers wide operating range, and dependability for municipal and industrial chlorination. It can handle up to 6000 ppd with either manual or automatic proportioning and is designed about an all-vacuum, solution feed system. A direct-reading flow meter, visible through a window at the front of the cabinet, enables an operator to spot any change in chlorine flow rate the instant there is an adjustment in chlorine rate valve. For data circle No. 2-9.

Molded plastic clamps for use with insert fittings are now being manufactured by the Carlon Products Corporation, 10225 Meech Ave., Cleveland 5, Ohio. These clamps are slipped over the pipe ends and tightened to force them down onto the serrations incorporated in insert fittings to create a positively leak-proof connection. This new clamp makes possible the installation of completely plastic pipe lines. They are made in sizes for ½ to 6-inch plastic pipe. Prior to this development, a steel clamp was used for insert connections. Circle No. 2-10.



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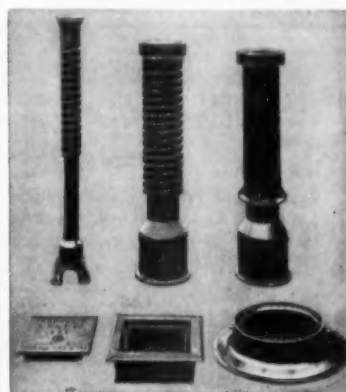
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Chicago, Ill.—The "Portafone," a new hand-held two-way radio which operates in the citizen's radio band where operator license is not required, now provides a quick, flexible and inexpensive means of short range communication. The light weight units may be operated by a battery pack; by a special power pack designed to plug into any 115



Lightweight Portafone radio transceiver provides easy communication.

volt, 60 cycle outlet; or with an adapter connected to any vehicle battery. Weighing only 28 oz., the unit is 17 in. high with antenna in place. Engineers will find an unlimited number of applications on all types of field work. For further information write to the manufacturer, Stewart-Warner Corp., 1826 Diversey Pkwy., Chicago 14, Ill., or circle No. 2-11 on the card.

• • •

Four-wheel steering is demonstrated by a new materials handling Shovel loader, which uses the same steering principle as a hook-and-ladder fire truck to turn sharp corners despite its 19-foot length. This unit has an inside turning radius of only 7 feet, 6 inches (most automobiles need 15 feet). The hi-flotation tires and high under-clearance permit efficient operation of the loader under extreme conditions of mud, snow, sand and uneven ground. Power steering on all four wheels (optional) also adds to the operator's control of the unit. Operator safety is secured by location of the seats at the rear and above the engine, away from all moving parts. Made by Baker-Lull Corp., 314 W. 90th St., Minneapolis, Minn. Circle No. 2-12 for data.

Tractor-drive generators for standby are now being made by D. W. Onan & Sons, Inc., Minneapolis, Minn. This equipment will enable tractor owners to provide their own low-cost emergency electric power when commercial power is off, or voltage drops. The unit includes an outdoor 2-pole, double-throw, 60-ampere manual transfer switch. The tractor engine speed can be adjusted for the desired voltage. Available in 3,000, 4,000, 7,000 and 10,000-watt capacities, these generators supply exactly the same 115/230 volt, 60-cycle A.C. current delivered by the commercial power lines. More data? Circle No. 2-13

• • •

Heavy-Duty Bantam Crane Carrier Lifts Six-Ton Load

WAVERLY, Iowa—The Schield Bantam Co. has announced the addition of an all-new, specially designed crane carrier. This has a 148-in. wheelbase; 4-wheel drive; 10 wheels with 8.25 x 20 tires; Hercules 6-cylinder engine, 282 cu. ins., developing 113 hp; 26-gallon gasoline tank; and a transmission that gives 10 speeds forward and two reverse. Axle ratings are 6,000 lbs. front and 26,000 lbs. rear. For working in restricted areas and for highway travel, clearance is important. The new carrier is 236 ins. overall length, 96 ins. wide and 114¾ ins. overall height. Total weight, with front and rear outriggers and fenders, but without the basic unit, counterweight and front-end at-



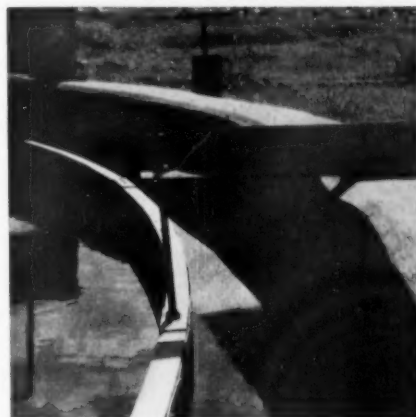
Versatile new Schield-Bantam crane handles all types of construction.

tachment, is 11,660 lbs. An outstanding feature for both lifting and excavating is the two-position mounting of the upper machinery. This insures the maximum use of the 12,000-lb. lifting capacity, and greater stability with clamshell, dragline, magnet crane, pile driver and concrete handling attachments. Check No. 2-14 on Service Card.

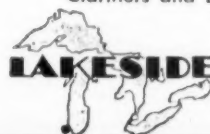
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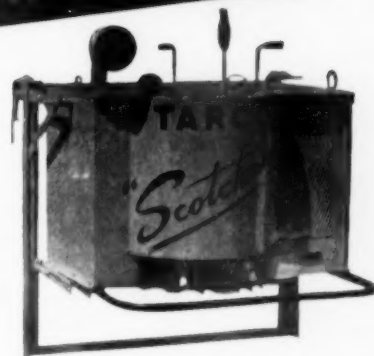
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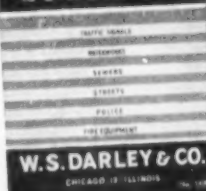


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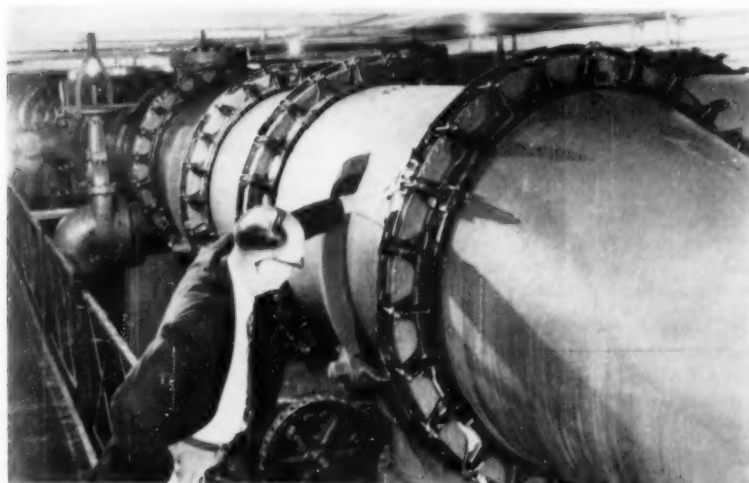
—Worth Seeing



This Austin over-shot tractor loader, in one to seven-yard capacities, is going to be a Galion All-steel Body Company product from now on. Originally made in Denver, its manufacture and sales are being moved bag, baggage, and buckets to their Galion, Ohio, location.



When power for the 300-bed St. Joseph Hospital in Rimouski, Quebec, was lost by an explosion in the city's main power plant, this big mobile Caterpillar Diesel electric set hit the 700-mile road from Albany, N.Y. Next morning St. Joseph's was receiving full (Cat) power as you see it.



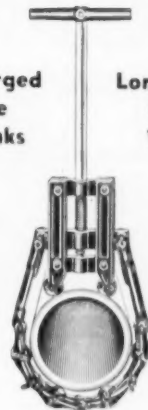
Here's how City of Grand Rapids, Michigan, protects large diameter joints against future leakage in the main pumping station of its water works. Pump Station Engineer Walsworth is shown inspecting Dresser 48-in. Style 60 Bell Joint Clamp.

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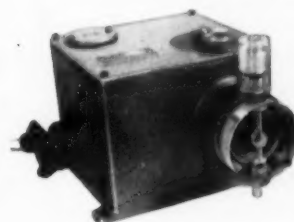
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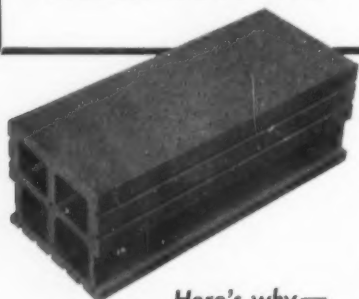
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**WORTH
TELLING**

by Arthur K. Akers

★ **AT JEFFREY MANUFACTURING COMPANY**, Columbus, Ohio, Leon H. MacReynolds bounces back to the top post as manager of public relations.



Mr. Shedd

★ **KEN J. SHEDD** will now be district sales representative for **Dempster Brothers**, Knoxville, (Dumpsters, Diggsters, etc.) in their north middle western territory, with Tulsa, Okla., as headquarters. He was formerly a sales manager for Gar Wood Industries Load Packer division.

★ **NOW IT'S** full-Colonel Joseph J. Gilbert—but still "Mr. Link-Belt" to you in the sanitary engineering field. Congratulations on the promotion!

★ **INTERNATIONAL HARVESTER COMPANY**, continuing its program to round out a full line of equipment in the industrial power and earth-moving industry, announces an agreement with the Heil Company, Milwaukee, which will enable Harvester to manufacture two-wheel rubber-tired industrial tractors for heavy construction work. These "Heiliners" will now be sold through I.H.'s industrial power division under the "International" trade name.

★ **NEW MOVIES** available: 16 mm. sound color, featuring the Hyster "Hystaway," entitled "Design for Excavating." Also, "The Gamblers" by Caterpillar Tractor, a dramatic lesson for careless operators of heavy construction machinery.

★ **WILLIAM J. KLEIN** is vice president and general sales manager of Allis-Chalmers Manufacturing Corporation's tractor division, Milwaukee.

★ **P. S. WILSON**, Glen Ridge N.J., now represents Welsbach Corporation's Kitson line of water works brass goods and tapping machines in the New York metropolitan area.

★ **THE DORR COMPANY** promotes these to vice president: Frank H. Conover, Harold B. Coulter, John D. Grothe (also a director), Douglas C. Reybold, and Dr. Elliott J. Roberts.

★ **THE PERMUTIT COMPANY**, water conditioning equipment, New York, is building a modern new plant at Lancaster, Pa. Later in the year, manufacture of Simplex Valve and Meter Company products will be moved there. Permutit's main offices in New York and factory at Birmingham, N. J. are unaffected.

★ **THE RIDGE TOOL COMPANY** of Elyria, Ohio, announces Ralph W. Hamlin is replacing C. O. Hollen, retired, as North Atlantic territory sales representative. M. B. ("Pat") Williams takes over from Washington, D. C., southward to South Carolina.



Mr. Conover

★ **PICTURED HERE** is F. W. Conover, new manager of the industrial sales department, Ford Tractor Division, at Birmingham, Mich. Mr. Conover's prior affiliations include: national service manager Dearborn Motors; and executive positions with Chevrolet Division of General Motors and the Firestone Tire and Rubber Company.

★ **W. S. DICKEY** Clay Manufacturing Company announces its sixth new plant, located in Meridian, Miss. Said to be the most modern in the country, it is Mississippi's first such operation.

★ **THE GREEN FIREMAN** got up on the locomotive tender, tugged at the tank's spout-chain—and fell in. The old engineer watched his floundering with jaundiced eye. "Just fill the tank with water, sonny," he drawled; "No need to stamp the stuff down."

—N.D. Coarse Screenings.

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TP-75-C-2 gives further information on the W&T Series A-635 Volumetric Fluoridator

